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NATIONAL DAM SAFETY PROGRAM. LOON LAKE DAM (INVENTORY NUMBER NY--ETC(U)
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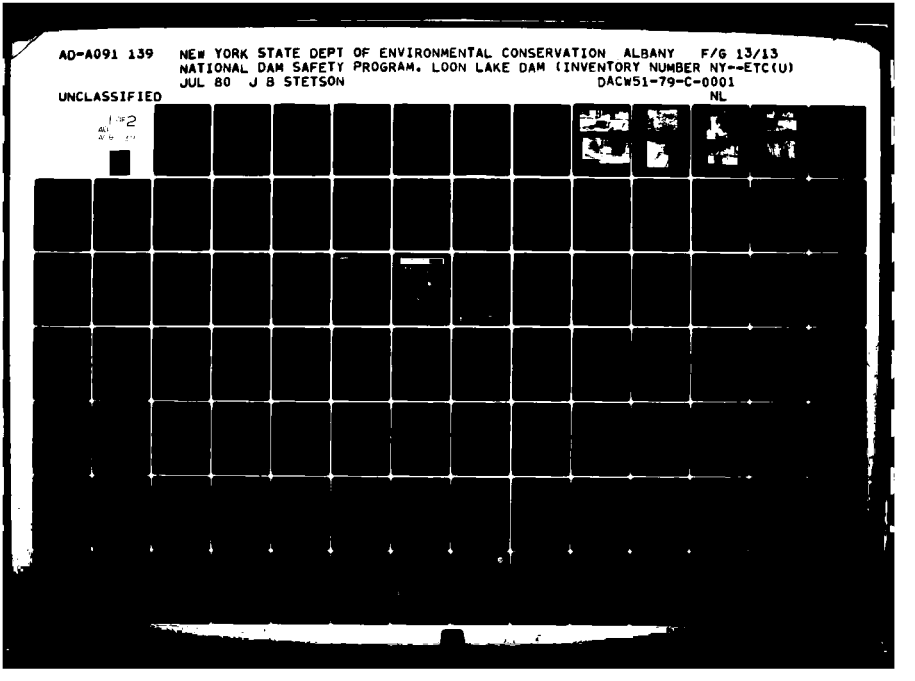

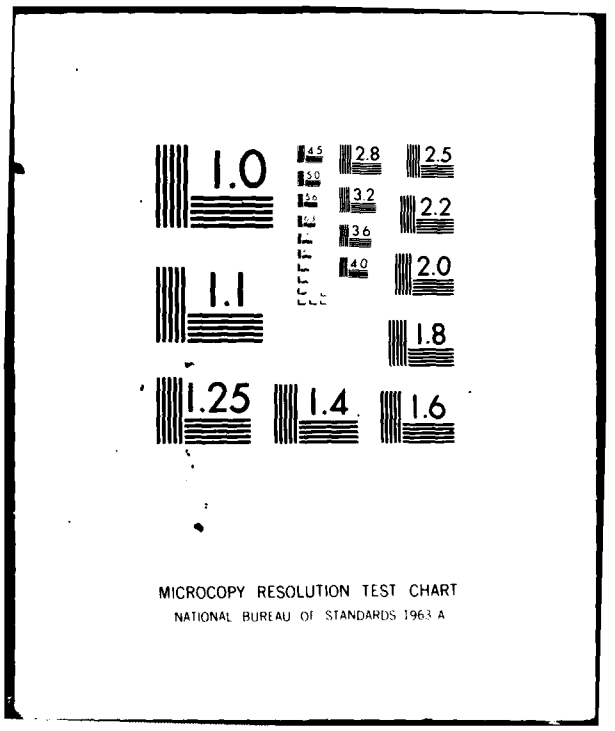

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Loon Lake Dam
Warren County
Chester Creek

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

The examination of documents and visual inspection of the dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property. The dam, however, has a number of problem areas which require further investigation and remedial work.

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The structural stability analysis indicates unsatisfactory stability would result from loadings which could occur during normal winter operations. Marginal stability is indicated during the Probable Maximum Flood (PMF) and 1/2 PMF flows. A structural stability investigation should be commenced within six months to determine the characteristics of the uplift forces acting on the dam, the properties of the existing dam, and the effect of these conditions on the stability of the dam. Remedial work should be undertaken, depending on the results of this investigation and completed within two years.

The hydrologic/hydraulic analysis indicates that the spillway will pass only 12.5% of the Probable Maximum Flood (PMF). The dam will be overtopped by 6.72 feet and 2.33 feet by the PMF and 1/2 PMF respectively. The auxiliary dam located just upstream of the outlet dam would restrict outflow from the impoundment in the event of failure of the outlet dam during the 1/2 PMF. Therefore, failure of the dam during the 1/2 PMF would not significantly increase the downstream hazard from that which would exist just prior to dam failure so that the spillway is assessed as inadequate.

The following remedial work should be undertaken within 1 year:

1. Seepage near the west abutment of the dam should be kept under close surveillance to detect any increase in flow. Immediate repair measures should be undertaken in the event that seepage increases.

2. Repairs should be made to deteriorated concrete surfaces on the right abutment near the reservoir drain.

3. A flood warning and emergency evacuation system should be implemented to alert the public, in the event conditions occur which could result in failure of the dam.

4. A formalized inspection system should be initiated to develop data on conditions and maintenance operations at the facility.

UPPER HUDSON RIVER BASIN

LOON LAKE DAM

WARREN COUNTY
NEW YORK

INVENTORY Nº NY 795

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM.

(6) Loon Lake Dam (Inventory number NY-795), Upper Hudson River Basin, Warren County, New York. Phase I Inspection Report.

(10) John F. Peters

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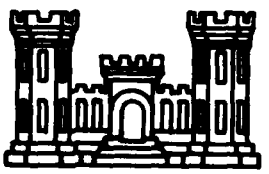

NEW YORK DISTRICT CORPS OF ENGINEERS

(11) JUL 80

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam Loon Lake Dam, NY795

State Located New York
County Located Warren
Stream Chester Creek
Date of Inspection April 21, 1980

ASSESSMENT OF GENERAL CONDITIONS

The examination of documents and visual inspection of the dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property. The dam, however, has a number of problem areas which require further investigation and remedial work.

The structural stability analysis indicates unsatisfactory stability would result from loadings which could occur during normal winter operations. Marginal stability is indicated during the Probable Maximum Flood (PMF) and 1/2 PMF flows. A structural stability investigation should be commenced within six months to determine the characteristics of the uplift forces acting on the dam, the properties of the existing dam, and the effect of these conditions on the stability of the dam. Remedial work should be undertaken, depending on the results of this investigation and completed within two years.

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3. A flood warning and emergency evacuation system should be implemented to alert the public, in the event conditions occur which could result in failure of the dam.

4. A formalized inspection system should be initiated to develop data on conditions and maintenance operations at the facility.

Dale Engineering Company

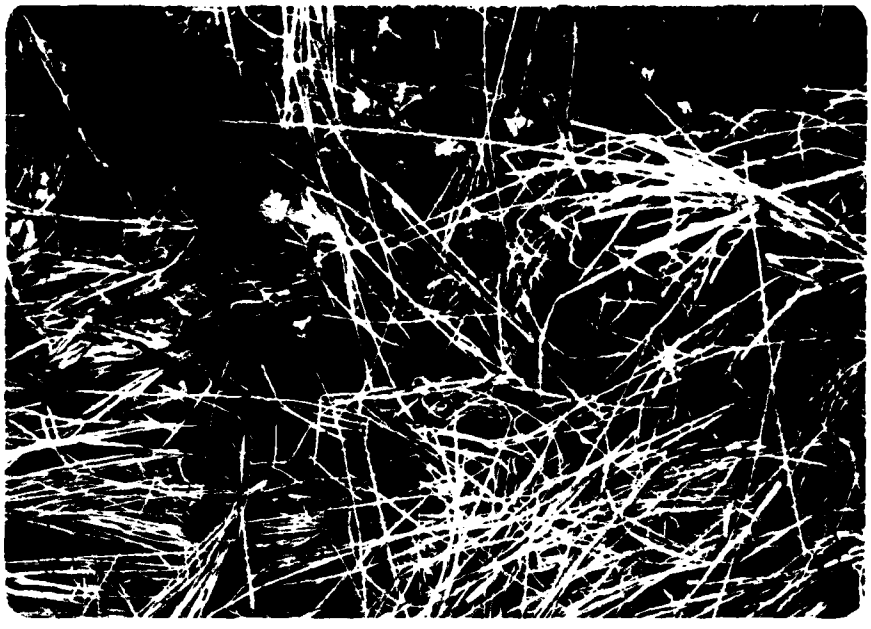
John B. Stetson, President

Approved By:
Date: 28 AUG 1980

Col. N.M. Smith, Jr.
New York District Engineer

1. Loon Lake Dam as viewed from New York State Route 8 and 9. Auxiliary Dam is visible in background.

2. Auxiliary Dam 300± feet upstream from Loon Lake Dam.



3. Area of minor seepage near west abutment.

4. West abutment, upstream of Dam opposite wet area shown above. Slope was covered with concrete in Fall of 1978.

5. Outlet of low level drain. Note spalled concrete on spillway abutment.

6. View of Dam from upstream. New York State Route 8 and 9 visible in background.

7. Receiving stream showing bridge at New York State Route 8 and 9.

8. Receiving stream below bridge at New York State Route 8 and 9.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM - LOON LAKE DAM ID# - NY 795

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and The New York State Department of Environmental Conservation.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the existing condition of the Loon Lake Dam and appurtenant structures, owned by the Town of Chester, New York, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the State of New York.

This Phase I inspection report does not relieve an Owner or Operator of a dam of the legal duties, obligations or liabilities associated with the ownership or operation of the dam. In addition, due to the limited scope of services for these Phase I investigations, the investigators had to rely upon the data furnished to them. Therefore, this investigation is limited to visual inspection, review of data prepared by others, and simplified hydrologic, hydraulic and structural stability evaluations where appropriate. The investigators do not assume responsibility for defects or deficiencies in the dam or in the data provided.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Loon Lake Dam is located in the Town of Chester, approximately two miles west of the Hamlet of Chestertown. The dam is situated just upstream of a bridge on Routes 8 and 9 which crosses Chester Creek, the receiving stream from the impoundment. The dam is constructed of concrete and masonry with a grouted stone face on the downstream side. The dam is approximately 14.5 feet high and 105 feet long. The main spillway is centered on the dam and is 32 feet, 8 inches long. The spillway is equipped with flashboards which are used to regulate the elevation of the water in Loon Lake. The maximum height of the flashboards is 2 feet. A wood frame gate structure is located on the west abutment of the spillway. This structure

accommodates the control mechanism for the 2 foot by 2-1/2 foot sluice gate which is used to drain the impoundment.

An auxiliary dam, constructed of earth and rocks, (See Figure 3) is located approximately 300 feet upstream from the Loon Lake Outlet Dam. This dam was previously the site of an old dam which controlled the level of Loon Lake. This dam was reconstructed in 1950 to provide an auxiliary means of controlling the water level in Loon Lake while the Loon Lake Outlet Dam was repaired. The spillway of this dam is continually submerged by approximately 2 feet of water. The crest of the spillway is 4 feet below the top of the dam and the top of the dam is 9 feet, 8 inches above the natural bed of the lake at this point. The dam also is equipped with a 48 inch corrugated metal pipe drain line which is used to allow flow through the dam during those periods when the structure is used to control the level of Loon Lake. Sand bags are used to block the spillway, thus maintaining the level of Loon Lake when the lower dam impoundment is drained.

b. Location

The Loon Lake Dam is located in the Town of Chester, Warren County, New York.

c. Size Classification

The maximum height of the dam is approximately 14-1/2 feet. The volume of the impoundment is approximately 6580 acre feet. Therefore, the dam is in the Intermediate Size Classification as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

Chester Creek, the receiving stream from Loon Lake, flows through the Hamlet of Chestertown, approximately 2 miles downstream from the dam. Several residences are located close to the stream in this area. Therefore, the dam is in the High Hazard Category as defined by the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the Town of Chester, New York.

Contact: Schuyler J. Martin,
Supervisor, Town of Chester
Chestertown, New York 12817
Telephone: 518-494-2711 Town Hall

f. Purpose of the Dam

The dam is used to control the level of Loon Lake for recreational purposes.

g. Design and Construction History

The plan included in this report indicates that the dam was reconstructed in 1941 at the site of an existing masonry and timber dam. Previous dam reports also included in this report indicate that the dam existed prior to 1914 when it was inspected by the Conservation Department. Subsequent reports in 1917 indicate the dam to be in poor condition while another report in 1920 does not remark as to the condition of the dam. The dam, as it presently exists, substantially conforms to the plans provided in 1941. Correspondence is also included in this report which indicates that repairs were performed on the dam during the fall of 1978. Town officials who accompanied the inspection team indicated that concrete was poured on the upstream slope of the dam near the west abutment to attempt to seal leakage which was occurring in this area.

h. Normal Operational Procedures

The facility is operated by the Town of Chester. The flashboards at the spillway are used to control the level of Loon Lake for recreational purposes.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of Loon Lake Dam is 12.32 square miles.

b. Discharge at Dam Site

No discharge records are available for this site.

Computed Discharges:

Ungated Spillway, Top of Dam (Without Flashboards)	835	cfs
Ungated Spillway (With Flashboards 24 Inches High)	307	cfs
Reservoir Drain - (2 ft. x 2.5 ft. sluice)	63	cfs

c. Elevation (Feet Above MSL ESTIMATED FROM USGS MAP)

Top of Dam	870
Spillway Crest	866
Stream Bed at Centerline of Dam	855.5

d. Reservoir

Length of Normal Pool	15,000± FT

e. Storage

Top of Dam	8965	Acre Feet
Normal Pool	6580	Acre Feet

f. Reservoir Area

Top of Dam	650	Acres
Spillway Pool	550	Acres

g. Dam

Type - Concrete and Masonry, Gravity.
Length - 105 Feet, 6 Inches.
Height - 14 Feet, 6 Inches.
Freeboard Between Normal Reservoir and Top of Dam - 2.0 Feet.
Top Width - 3 Feet, 0 Inches.
Side Slopes - Upstream - Vertical; Downstream - 1 Horizontal, 2.5 Vertical.
Grout Curtain - None.

h. Spillway

Type - Broad Crested.
Length - 32 Feet, 8 Inches.
Crest Elevation - 866.
Gates - None.
U/S Channel - Lake - Natural.
D/S Channel - Natural Gravel.

i. Reservoir Drain

2 feet x 2-1/2 feet sluice gate.

SECTION 2 - ENGINEERING DATA

2.1 GEOTECHNICAL DATA

No records of subsurface investigations for this structure were available. The only information regarding the foundation materials came from a 1941 application for reconstruction of the dam. This application states that the natural material on which the proposed dam will rest is "embedded gravel and bolders in hardpan material." This information has been included in Appendix B.

2.2 DESIGN RECORDS

No records were available from the original design of the dam. The plan for the 1941 reconstruction of the dam is included as Figure 2. The specifications for this work is included in Appendix B.

2.3 CONSTRUCTION RECORDS

No information was available concerning either the original construction or the reconstruction of this dam.

2.4 OPERATIONAL RECORDS

There are no operational records available for this dam.

2.5 EVALUATION OF DATA

The data presented in this report was obtained from the Department of Environmental Conservation files. The information available appears to be reliable and adequate for a Phase I inspection report.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The Loon Lake Dam was inspected on April 21, 1980. The Dale Engineering Company Inspection Team was accompanied on the inspection by Schuyler Martin, Supervisor of the Town of Chester.

b. Dam

At the time of the inspection, the water level in the impoundment was approximately 22-1/2 inches above the spillway level, flashboards were in place to a height of 18 inches, and 4-1/2 inches of flow was cresting the top of the flashboards. The flow over the spillway obscured view of the spillway surface. Surface spalling of the concrete was evident on the abutments of the spillway. The grouted stone surface of the non-overflow section appeared to be in good condition. Minor seepage was evident near the west abutment of the dam. Repairs had reputedly taken place in 1978 to eliminate seepage in this area. The photographs show an area on the upstream face of the west abutment where concrete was placed to seal off leakage. Visual observation did not disclose physical displacement of the alignment of the structure and the facility appears to be structurally stable.

c. Appurtenant Structures

The wood frame control structure which houses the control for the principal drain of the impoundment appears to be in good condition. The concrete wall which forms the abutments of the dam show no signs of deformation.

d. Control Outlet

Flow from the impoundment is controlled by varying the height of the flashboards in the principal spillway. Flashboards were in place to a height of 18 inches at the time of the inspection. These flashboards appeared to be in good repair and showed no signs of deformation. The drain line from the impoundment is controlled by a 2 foot by 2-1/2 foot sluice gate.

e. Reservoir Area

The reservoir area extends approximately 15,000 feet to the north. Approximately 300 feet into the reservoir is situated an auxiliary dam which may be used to control the level of Loon Lake while the pond behind the major structure is drained for repair of the dam.

f. Downstream Channel

The downstream channel is formed in sand and gravel and passes through a concrete box culvert (see photograph No. 7) approximately 100 feet downstream from the dam. New York State Route 8 and 9 crosses the receiving stream at this point. This highway is a major traffic route through the area. Downstream from the highway culvert, the channel is heavily overgrown with willows and alders. No evidence of recent erosion was noted in the channel.

3.2 EVALUATION

The visual inspection revealed that the dam is generally in good condition with only minor surface spalling of the concrete surfaces. The sluice gate structure is in operating condition and was generally in good structural condition. The minor seepage near the west abutment appears to have been the remains of an effort to seal what was described as substantial leakage in this area in 1977. Continual surveillance should be maintained at this point of seepage to detect any worsening of the present condition. Appropriate steps should be taken to seal off the seepage, should the condition worsen.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The normal operating procedure for this structure is to control the water level in Loon Lake for recreational purposes. This is accomplished through adjustment of the flashboards on the spillway. The Supervisor of the Town of Chester indicates that additional flashboards are normally placed on the dam during the summer recreation season.

4.2 MAINTENANCE OF THE DAM

Maintenance and operation of the dam is controlled by the Town of Chester. Periodic visits are made to the site to check on the conditions of the facilities. No formal reporting system is in effect at this site.

4.3 MAINTENANCE OF OPERATING FACILITIES

The gate controlling the drain line from the impoundment is presently in operating condition.

4.4 DESCRIPTION OF WARNING SYSTEM

No warning system is in effect at present.

4.5 EVALUATION

The dam and appurtenances are normally inspected by representatives of the Town of Chester. The facility is presently in good condition. There is no evidence of deterioration caused by lack of maintenance. Since the dam is in the high hazard classification, a warning system should be implemented to alert the public should conditions occur which could result in failure of the dam.

SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The Loon Lake Dam is located in the north-central portion of Warren County, approximately two miles northwest of Chestertown, New York. The dam has a drainage area of 12.3 square miles, which is characterized by moderately steep to steeply sloping hills. The reservoir has a surface area of approximately 600 acres and outlets into Chester Creek, which flows eastward through Chestertown to the Schroon River.

5.2 ANALYSIS CRITERIA

The purpose of this investigation is to evaluate the dam and spillway with respect to their flood control potential and adequacy. This has been assessed through the evaluation of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the flood through the reservoir and the dam's spillway system. The PMF event is that hypothetical flow induced by the most critical combination of precipitation, minimum infiltration loss and concentration of run-off of a specific location that is considered reasonably possible for a particular drainage area. Since the dam is in the Intermediate Dam Category and is a High Hazard, the Recommended Guidelines for Safety Inspection of Dams (Ref. 1) require that the spillway be capable of passing the Probable Maximum Flood.

The hydraulic analysis is performed to determine the capacity of the spillway and to determine the extent of the overtopping of the dam which could occur during the PMF. In establishing the spillway capacity, it was assumed that no flashboards were in place on the spillway. It should be noted that the placement of flashboards will further decrease the spillway capacity so that overtopping could occur at lesser flows than those indicated in the analysis.

The hydrologic analysis was performed using the unit hydrograph method to develop the flood hydrograph. Due to the limited scope of this Phase I investigation, certain assumptions, based on experience and existing data were used in this analysis and in the determination of the dam's spillway capacity to pass the PMF. In the event that the dam could not pass the Probable Maximum Flood without overtopping, additional analyses are to be performed on potential dam failures if the dam is designated as a High Hazard Classification. This process was done with the concept that if the dam was unable to satisfy this criteria, further refined hydrologic investigations would be required.

The U.S. Army Corps of Engineers' Hydrologic Engineering Center's Computer Program HEC-1 DB using the Modified Puls Method of flood routing was used to evaluate the dam, spillway capacity, and downstream hazard.

The drainage area was divided into sub-areas to model the variability in hydrologic characteristics within the drainage basin. Unit hydrographs were defined by Snyder coefficients, C_t and C_p. Snyder's C_t was estimated to be 2.0 for the relatively steeply sloped drainage area and C_p was estimated to be 0.625. In calculating t_p (Snyder's lag) for sub-areas predominated by a lake, L (length of the main watercourse) and L_{CA} (length of main watercourse from the outflow point to the point along the channel opposite the center of gravity of the sub-basin) were measured from the lake shore. This procedure reflects the small increase in t_p due to travel time through a lake. In the case of the sub-area containing Loon Lake, the travel time across the lake from the main watercourse would be less than a tenth of an hour. This is on the same order of magnitude as the travel time of flows from other sub-areas passing through the lake. Run-off, routing and flood hydrograph combining was then performed to obtain the inflow into the reservoir.

The Probable Maximum Precipitation (PMP) was 17.4 inches according to Hydrometeorological Report (HMR #33) for a 24-hour duration storm, 200 square mile basin, while loss rates were set at 1.0 inches initial abstraction and 0.1 inches/hour continuous loss rate. The loss rate function yielded 83 percent run-off from the PMF. The peak for the PMF inflow hydrograph was 21,036 and the 1/2 PMF inflow peak was 10,518. The large storage capacity of the reservoir reduced these peak flows to 6,661 cfs for the PMF and 2,277 cfs for the 1/2 PMF.

5.3 SPILLWAY CAPACITY

The spillway is a weir type structure 32.67 feet in length. A spillway coefficient of 3.2 was assigned for the spillway rating curve development. The discharge capacity of the spillway at the top of dam elevation is 835 cfs with no flashboards in place. The spillway capacity with two feet of flashboards is only 307 cfs.

SPILLWAY CAPACITY

Flood	Peak Discharge	Capacity as % of Flood Discharge
PMF	6,661 cfs	12.5%
1/2 PMF	2,277 cfs	36.7%

5.4 RESERVOIR CAPACITY

The reservoir storage capacity was estimated from USGS mapping and the New York State Department of Environmental Conservation Educational Leaflet on Loon Lake.

The resulting estimates of the reservoir storage capacity are shown below:

Top of Dam	8,965 Acre Feet
Spillway Crest	6,580 Acre Feet

5.5 FLOODS OF RECORD

There is no information on water levels at the dam site.

5.6 OVERTOPPING POTENTIAL

The HEC-1 DB analysis indicates that the dam will be overtopped as follows:

Flood	Maximum Depth Over Dam
PMF	6.72 Feet
1/2 PMF	2.33 Feet

The box culvert just downstream of the dam acts as a flow restriction under high flows. Analysis based on the limited information obtained for this study indicate that the dam will be submerged under the 1/2 PMF and PMF events due to this downstream construction. This condition would result in somewhat lower discharge capacities for the spillway under high flows than indicated here.

The auxiliary dam just upstream of the inspected structure will prevent large volumes of the reservoir from being drained in the event of a failure of the masonry outlet dam. In the opinion of the inspection team, failure of the outlet dam would not significantly increase the downstream hazard.

5.7 EVALUATION

The spillway is inadequate to pass the PMF without overtopping the dam. However, in the opinion of the inspection team, failure of the outlet dam during the 1/2 PMF event would not significantly increase the downstream hazard due to the flow restriction provided by the upstream auxiliary dam. Therefore, the spillway is inadequate according to the Corps of Engineers' screening criteria. The placement of flashboards further reduces the capacity of the spillway and could cause overtopping at flows much less than those indicated in this analysis.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

This concrete and masonry dam, approximately one-hundred feet in total length, includes a center spillway section on the order of thirty-three feet long. The area behind the westerly dam section (right end facing downstream) is earth-fill or natural soil, with the result that the westerly shoreline generally extends straight back from the west limit of the spillway. The reservoir immediately behind the easterly section of dam is ground, but the easterly shoreline bends further east as distance progresses into the impounding area. The general effect is that the impounding area behind the dam is not greatly wider than the spillway. A second dam structure situated several hundred feet back into the impounding area is submerged when the reservoir is at the spillway level of Loon Lake Dam.

A highway, co-designated U.S. Route 9 and New York State Route 8 is located approximately 100 feet downstream of the dam. The receiving stream leads to a large box culvert which passes through the embankment constructed as part of this general section of highway. No evidence of significant erosion within the receiving stream or in the vicinity of the box culvert was noted.

The dam apparently is founded in soil; no evidence of rock outcropping was noted. The downstream sides of the dam sections indicate a layed-up stone structure which has received a gunite surface. The downstream face of the spillway is concrete. Observations indicate the dam retains structural stability, with no signs of structural displacement. Deterioration has occurred at the concrete section comprising the headwall for the westerly end of the spillway. Some seepage takes place near the toe of the westerly dam section. Flow occurring over the spillway at the time of the field observations interfered with efforts to inspect for evidence of underdam seepage and streambed erosion.

b. Geology and Seismic Stability

Geologically, Loon Lake is located within the southeastern part of the Adirondack Province.

State Engineering Reports (1913, 1917, 1920, 1941, 1950) describe the dam as being sited on a glacial gravel or boulder till. The 1917 report also states that the "natural rock embankment prevents water from flowing."

The field observations for the present study indicate the dam and the abutments are founded in a glacial boulder till. Exposures of such material are seen nearby downstream of the dam. A till of this type is usually relatively impermeable. However, a minor seep is present

at the west end of the dam about three feet above the present stream level.

The Geologic Map of New York (1970) refers to the bedrock around Loon Lake as being undivided metasedimentary rock of unknown age, while Reference #17 indicates the bedrock around Loon Lake consists mostly of white to gray gneisses of the Precambrian Grenville. No bedrock exposures were seen in the vicinity of the dam.

Extensive faulting exists in the bedrock in the area of the dam. Those faults which show significant displacement are outlined in the following table and are shown on the Geologic Map, Figure 5.

No.	Name of Fault	Distance From Dam	Displacement
1	Chestertown	.6 mi. NE	300 ft.
		2.5 mi. SE	700 ft.
2	Glen-Riparms	3 mi. W	300-600 ft.
3	Loon Lake Mtn.	2.25 mi. N	700 ft.
4	Schroon Lake	2.5 mi. N	400 ft.

A number of earthquakes of low intensity (less than III, Modified Mercalli) have occurred in this region but only two of significance have been recorded. One occurred in 1916 about 8 miles ENE of the dam, with an intensity of V. The second occurred in 1946, about 13 miles NNE, with an intensity of III.

The Seismic Probability Map locates the dam in a Zone 2 Designation. However, the large number of faults with significant displacement suggests the possibility of a major earthquake.

c. Data Review and Stability Evaluation

Design drawings available for review show the plan and elevation for the dam and the cross section for the spillway but do not include information on the properties of the dam and foundation materials, nor stability analysis. As part of the present study, stability evaluations have been performed for the dam spillway section. Actual properties of the dam's construction materials and foundations were not determined as part of this study; where information on properties were necessary for computations but lacking, assumptions felt to be practical were made. These stability computations assumed a dam cross-section based on dimensions indicated by the plans included in this report. It should be considered that in areas where deterioration has occurred the section dimensions would be less than indicated by the plans, with some adverse effect on the structural strength expected. The analysis also assumed the dam section to be a monolith possessing necessary internal resistance to shear and bending occurring as a result of loading.

The results of the stability computations are summarized in the table following this page. The stability analysis are included in Appendix D.

The engineering calculations indicate stability for the normal operations condition with the reservoir level at spillway elevation, although the computed factor of safety against sliding is low.

The analysis indicate unsatisfactory stability against overturning and sliding for the dam subject to forces possible during normal winter operations which include ice loading, according to Corps of Engineers' evaluation criteria, (i.e., factor of safety less than unity, and, where the resultant of forces acting on the dam is located outside of the middle-third of the base, tensile stresses would develop in the dam section, a condition which is structurally undesirable).

The analysis indicate marginal stability for the 1/2 PMF condition and inadequate stability for the PMF condition. For evaluating these cases, the analysis assumed that lateral pressures acting on the back and front faces of the dam relate to the upstream and downstream flood levels respectively. Stability is expected if the structure becomes completely submerged under a static water level (e.g., any difference in reservoir and downstream water levels does not occur in the vicinity of the dam).

With seismic effects imposed onto the conditions for normal operation, inadequate to marginal resistance to sliding is indicated.

Critical to the analysis for cases indicating instability is the item of uplift water pressure acting on the base of the dam. For each case analysed, the uplift force was based on a full headwater hydrostatic pressure acting on the dam's upstream corner and a full tailwater hydrostatic pressure acting at the dam's downstream corner. Uplift pressures were assumed to vary linearly between the dam's upstream and downstream corners, and act upon 100 percent of the dam base. It is possible the site's glacial till foundation is relatively impermeable and full uplift as assumed might not act, particularly for the 1/2 PMF and PMF case because of the relatively short time period that the condition would exist.

The available information limits evaluation of the factors which could affect the westerly and easterly dam/abutment sections of this structure. The source of the seepage noted at the dam's westerly end requires further investigation. The lack of information extends to the as-built properties of the older, original masonry section comprising the upstream portion of the existing spillway; this section may penetrate to a greater depth than indicated by present available information (and as used in the stability analysis for the present study). A deeper section would increase the spillway's resistance to sliding and overturning and would affect the underdam seepage and uplift.

RESULTS OF STABILITY COMPUTATIONS

	Loading Condition	Factor of Safety* Overturning	Factor of Safety* Sliding**	Location of Resultant Passing through Base***
(1)	Reservoir level at spillway elevation, uplift on base	1.62	1.04	0.38b
(2)	Reservoir at spillway elevation, uplift on base plus 7.5 kip per foot ice load acting	0.60	0.5±	Outside of base
(3)	Water levels against upstream face and downstream face based on 1/2 PMF elevations, uplift on base	1.13	1.0	0.60b
(4)	Water elevations against upstream face and downstream face based on PMF elevations, uplift on base	1.0	Close to unity but with uplifting possible	At toe
(5)	Reservoir level at spillway elevation, uplift on base, seismic effect applicable to Zone 2	1.43	Close to unity	0.29b

* These factors of safety indicate the ratio of moments resisting overturning to those moments causing overturning, and the ratio of forces resisting sliding to those causing sliding.

** As determined on basis of friction only.

*** Indicated in terms of dam's base dimension, b, measured from the toe of the dam.

Further investigation is recommended to ascertain the as-built features of the dam and to determine the earth and seepage conditions surrounding and underlying the dam's location. The area of noted seepage represents one specific location where monitoring of flows is required. Final stability studies can be conducted on the basis of conditions revealed. The need to develop methods for improving the stability of this dam should be anticipated.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

The Phase I inspection of the Loon Lake Dam did not indicate conditions which would constitute an immediate hazard to human life or property.

The hydrologic/hydraulic analysis indicates that the spillway will pass only 12.5% of the PMF. The dam will be overtopped by 6.72 feet and 2.33 feet by the PMF and 1/2 PMF respectively. However, failure of the outlet dam during the 1/2 PMF event would not significantly increase the downstream hazard from that which would exist just prior to failure due to the flow restrictions provided by upstream auxiliary dam. The spillway capacity, therefore, is classified as inadequate.

The following specific safety assessments are based on the Phase 1 Visual Examination and Analysis of Hydrology and Hydraulics and Structural Stability:

1. The stability analysis indicates unsatisfactory stability during conditions which could occur from ice loading during normal winter operations. Marginal stability is indicated during 1/2 PMF and PMF flows.

2. Minor seepage is occurring near the west abutment.

3. Visual observations indicates minor surface spalling on concrete surfaces of the structure.

4. No warning system is presently in effect to alert the public, should conditions occur which could result in failure of the dam.

b. Adequacy of Information

The information available is adequate for this Phase 1 investigation.

c. Urgency

Items 2 through 4 in the safety assessment should be dealt with and appropriate improvements and repairs should be performed within one year of this notification. The remedial work required as a result of a detailed structural stability investigation should be completed within two years.

d. Need for Additional Investigation

Further investigations relative to the stability should be performed to determine appropriate remedial measures.

7.2 RECOMMENDED MEASURES

The following is a list of recommended measures to be undertaken to insure safety of the facility:

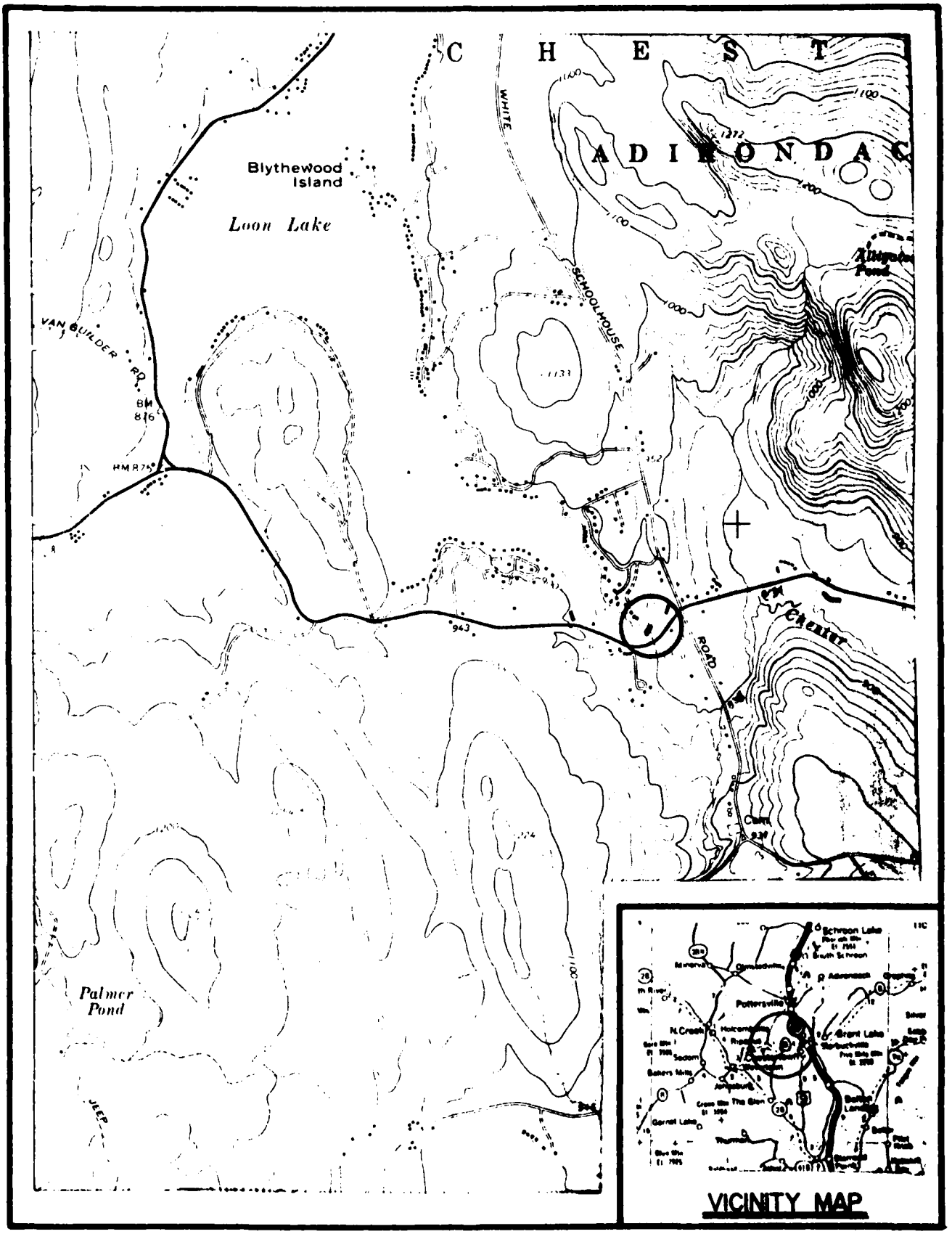
1. A structural stability investigation should be performed to determine the characteristics of the uplift forces acting on the dam, the properties of the existing dam, and the effect of these conditions on the stability of the dam. Remedial work should be undertaken depending on the results of this investigation.

2. The seepage near the west abutment of the dam should be kept under close surveillance to detect any increase in flow. Immediate repair measures should be taken in the event that the seepage increases.

3. Repairs should be made to deteriorated concrete surfaces.

4. A flood warning and emergency evacuation system should be implemented to alert the public in the event conditions occur which could result in failure of the dam.

5. A formalized inspection system should be initiated to develop data on conditions and maintenance operations at the facility.



LOCATION PLAN

FIGURE 1

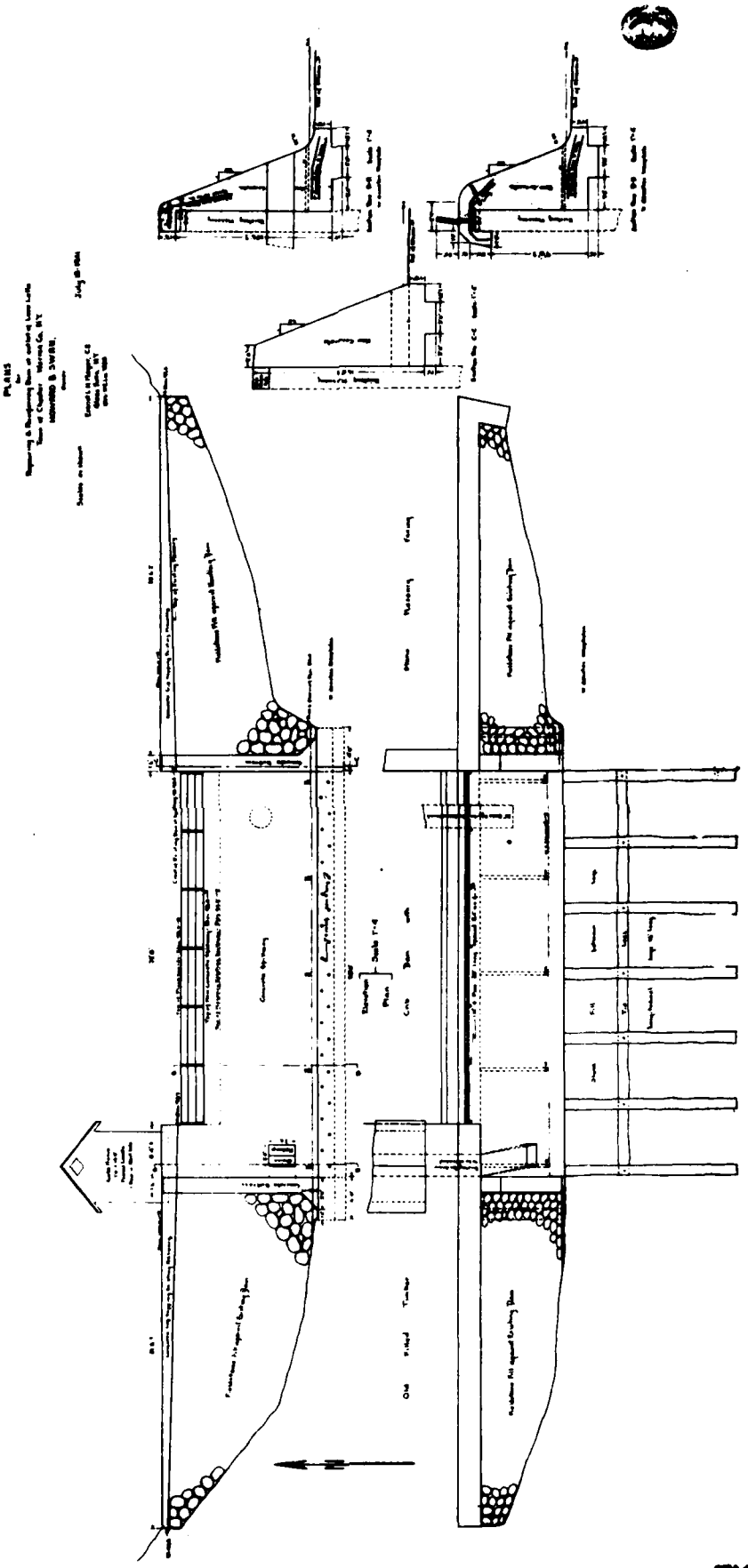


FIGURE 2

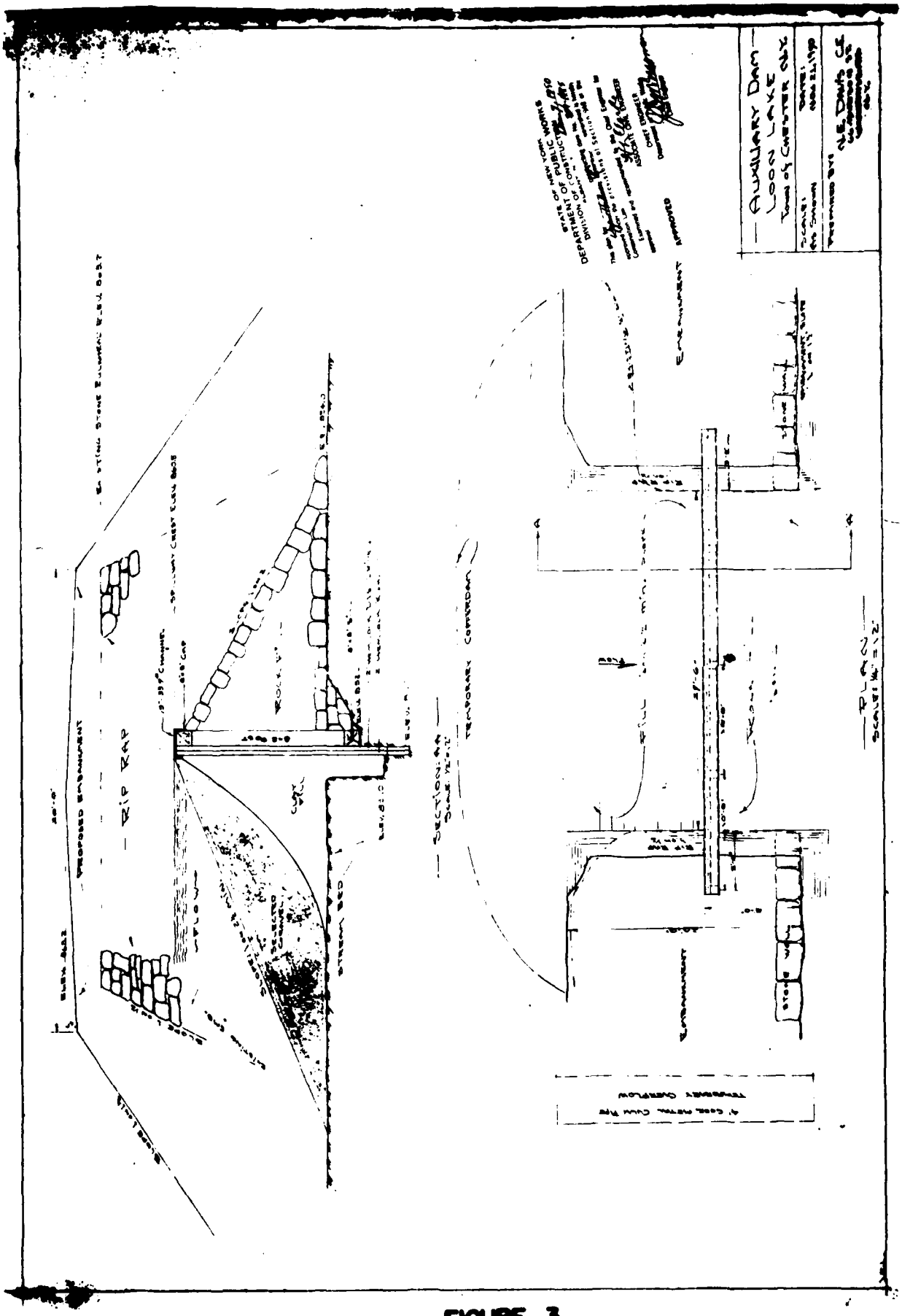

AUXILIARY DAM
LOON LAKE
TOWN OF CHESTER ORX
PROPOSED EMBANKMENT
RIP RAP
TEMPORARY COFFERDAM
PLAN
SECTION
STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
DIVISION OF CONSTRUCTION
APPROVED
CHIEF ENGINEER

FIGURE 3

EDUCATIONAL LEAFLET
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF EDUCATIONAL SERVICES

This material is reprinted from the Department's official magazine—
THE CONSERVATIONIST

LOON LAKE

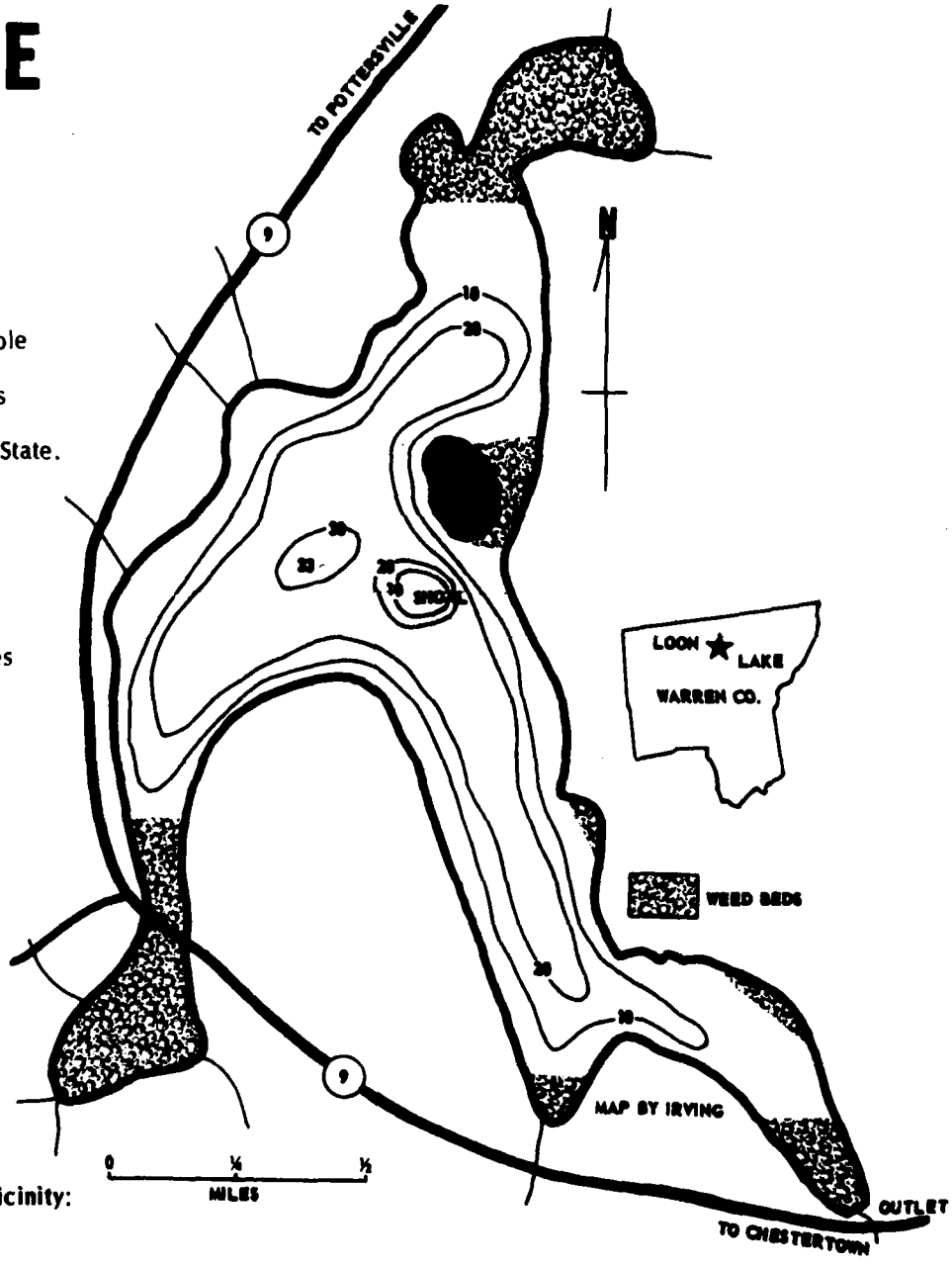
Location:
North Central Warren County
between Chestertown and
Pottersville on Route 9

General:
Tourist accommodations available
Boats available
The Warren County Loon Lake is
one of seven lakes and ponds
bearing this name in New York State.

Physical Features:
Area: 582 acres
Maximum Depth: 33 feet
Elevation: 866 feet
Length: Approximately 2.5 miles
Maximum Width:
Approximately .75 mile

Chemical Characteristics:
pH: Acid
Oxygen: Low in deepest waters

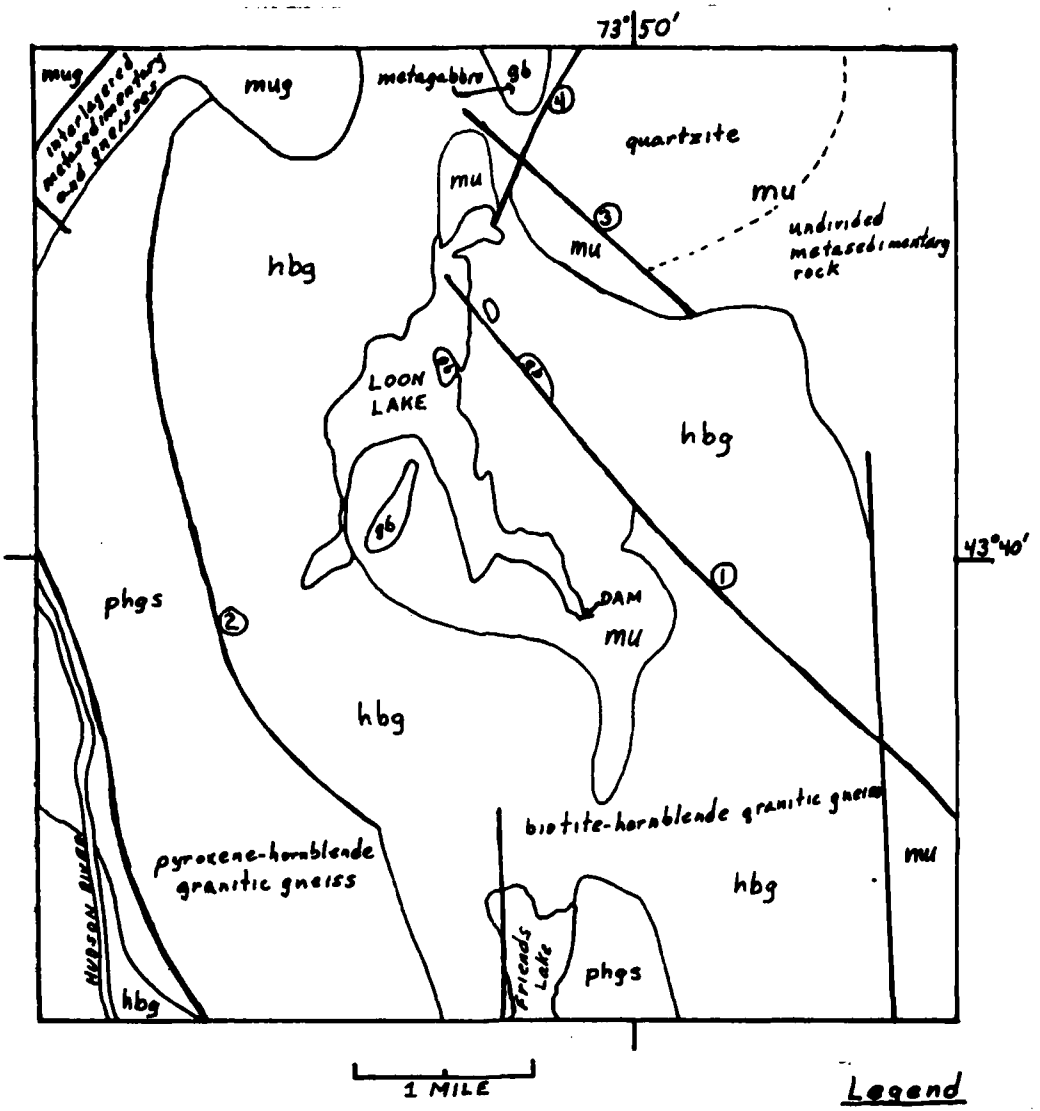
Hunting in Vicinity:
Deer
Grouse
Bear
Snowshoe Rabbit
Bobcat



Fur Bearers in Vicinity:
Beaver
Otter
Mink
Raccoon
Muskrat

Fish Present:
Brown bullhead
Northern pike
Yellow perch
Pikeperch
Smallmouth black bass
Largemouth black bass
Pumpkinseed
Red-bellied sunfish
Rock bass
Minnows
Suckers

FIGURE 4



GEOLOGIC MAP

Legend

- Rock type Contacts
- Fault
- ① Chestertown
- ② Glen-Riparius
- ③ Loon Lake Mountain
- ④ Schroon Lake

STETSON • DALE	DATE 6-2-80		FIGURE 5
	JOB 2399		

APPENDIX A

FIELD INSPECTION REPORT

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam Loon Lake **County** Warren **State** New York **ID #** NY-795

Type of Dam Concrete-Gravity **Hazard Category** High

Date(s) Inspection April 21, 1980 **Weather** Sunny **Temperature** 60's

Pool Elevation at Time of Inspection 867.9 **M.S.L.** **Tailwater at Time of Inspection** ---

Inspection Personnel:

J. A. Gomez	Dale Engineering Company	
F. W. Byszewski	Dale Engineering Company	
H. Muskatt	Dale Engineering Company	
D. F. McCarthy	Dale Engineering Company	

Schuyler Martin - Supervisor, Town of Chester

J. A. Gomez **Recorder**

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	No seepage observed through masonry. Spillway was flowing at time of inspection obscuring the face of the spillway.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Some rust-colored seepage about 10 ft. downstream of right abutment coming through west bank. Cracks at junction of abutment and training walls, both sides.	Non-overflow masonry walls extend both sides of spillway into earth embankments (probably natural ground). At ends of spillway, concrete training walls extend upstream for about 20'.
DRAINS	None observed.	At upstream end of west training wall another wall extends toward bank (parallel to abutment wall); area between abutment and training wall is backfilled.
WATER PASSAGES	See "Outlet Works".	
FOUNDATION	Probably gravel.	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Concrete surface eroded 4"-6" over spillway portion. Surface spalling at spillway abutments. Non-overflow pretty good - appeared to have been recently refurbished.	
STRUCTURAL CRACKING	Crack at junction of abutment walls with training walls extending upstream at right angles to abutment wall (both sides).	
VERTICAL & HORIZONTAL ALIGNMENT	No observed defects.	
MONOLITH JOINTS	None visible.	
CONSTRUCTION JOINTS	None visible.	
STAFF GAGE OF RECORDER	None.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	Not applicable.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	Not applicable.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Hole approximately 1 ft. diameter and 1 ft. deep in fill near junction of east abutment and training walls. Also hole in fill under gate house.	
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Not applicable.	
RIPRAP FAILURES	Not applicable.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No observed anomalies.	
ANY NOTICEABLE SEEPAGE	Seepage approximately 10 ft. downstream of west abutment wall, as previously noted. Seepage was rust-colored and was outletting through west bank.	
STAFF GAGE AND RECORDER	Not applicable.	
DRAINS	Not applicable.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Broad-crested. Downstream corner is rounded and downstream face steeply sloped. Upstream corner beveled to produce rounding effect.	
APPROACH CHANNEL	Pond - contained by training walls for 20 ft. above dam which produces an approach channel that is about 30 ft. wide.	
DISCHARGE CHANNEL	Gravel stream which passes under Routes 8 & 9 about 70 ft. downstream of dam (through box culvert). Box culvert's effective opening is 8.5 ft. high by 12 ft. wide. Approximately 14.5 ft. from stream to top of road.	Stream just downstream of Route 8 is about 20 ft. wide.
BRIDGE AND PIERS	None.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not applicable.	
APPROACH CHANNEL	Not applicable.	
DISCHARGE CHANNEL	Not applicable.	
BRIDGE AND PIERS	Not applicable.	
GATES AND OPERATION EQUIPMENT	Not applicable.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Concrete spalled and cracked near outlet.	
INTAKE STRUCTURE	Not observed.	
OUTLET STRUCTURE	Gate house over gate operation locked, therefore, gate operator not observed during inspection. Owner indicates the gate is in operating condition. Was used in 1978 to drain pond.	
OUTLET CHANNEL	Concrete box discharges to stream at right abutment.	
EMERGENCY GATE	Not observed.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Fairly clean until it reaches the vicinity of Schoolhouse Road, where it is choked by alders, etc.	
SLOPES	Super-critical slope 3-5% just downstream of Routes 8 & 9. Flat slope from Schoolhouse Road to Faxons Pond.	
APPROXIMATE NO. OF HOMES AND POPULATION	A dozen ± homes near stream two miles downstream in Chestertown, some within 5 ft. in elevation above stream.	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	3-15% (estimated).	
SEDIMENTATION	Not observed.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

NAME OF DAM Loon Lake Dam

ID # NY-795

ITEM	REMARKS
AS-BUILT DRAWINGS	No as-builts, see Plan in Report.
REGIONAL VICINITY MAP	USGS. See Location Plan.
CONSTRUCTION HISTORY	See Appendix B.
TYPICAL SECTIONS OF DAM	See Plan in Report.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See Plan in Report.
RAINFALL/RESERVOIR RECORDS	None known.

ITEM	REMARKS
DESIGN REPORTS	None available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available.
POST-CONSTRUCTION SURVEYS OF DAM	None available.
BORROW SOURCES	Not applicable.

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	See Appendix B.
HIGH POOL RECORDS	None available.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None available.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	See Appendix B.
MAINTENANCE OPERATION: RECORDS	None available.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	See Plan.
OPERATING EQUIPMENT PLANS & DETAILS	None available.

CHECK LIST
HYDROLOGIC & HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 12.3 sq. mi.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 6580 ac.-ft. @ elev. 866

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 8965 ac.-ft. elev. 870

ELEVATION MAXIMUM DESIGN POOL: 870

ELEVATION TOP DAM: 8965 ac.-ft. @ elev. 870

CREST:

a. Elevation 866 (spillway), 870 (abutments)
b. Type broad crested
c. Width 2 ft.
d. Length 32 feet, 8 inches
e. Location Spillover center of dam
f. Number and Type of Gates None

OUTLET WORKS:

a. Type Sluice gate 2 ft. x 2-1/2 ft.
b. Location Right of spillway
c. Entrance Inverts Not shown on plans
d. Exit Inverts Not shown on plans
e. Emergency Draindown Facilities Same as above

HYDROMETEOROLOGICAL GAGES:

a. Type None
b. Location None
c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: Unknown

APPENDIX B

PREVIOUS INSPECTION REPORTS/RELEVANT CORRESPONDENCE

(Note: ... one of these forms as completely as possible for each dam in your district, return it at once to the Con...

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

DAM REPORT

641 Upper Hudson 8-14-13

Aug 14, 1913
(Date)

CONSERVATION COMMISSION,

DIVISION OF INLAND WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the .... Dam.

This dam is situated upon the outlet of ... Lake (Give name of stream) in the Town of Chester, Warren County, about 2 mi. (State distance) from the Village ~~or City~~ of ....

The distance down (Up or down) stream from the dam, to the bridge (Give name of nearest important stream or of a bridge), is about .... (State distance).

The dam is now owned by Wm H. Fayon (Give name in full) and was built in or about the year ...., and was extensively repaired or reconstructed during the year ....

As it now stands, the spillway portion of this dam is built of .... (State whether of masonry, concrete or timber) and the other portions are built of masonry (State whether of masonry, concrete, earth or timber with or without rock fill).

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is gravel & stone and under the remaining portions such foundation bed is " "

FROM ...

The total length of this dam is 107 feet. The spillway or waste-weir portion, is about 32 feet long, and the crest of the spillway is about 2 1/2 feet below the top of the dam.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows:

one 7' pipe & gate

State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks which you may have observed.)

Good Condition

Few small leaks

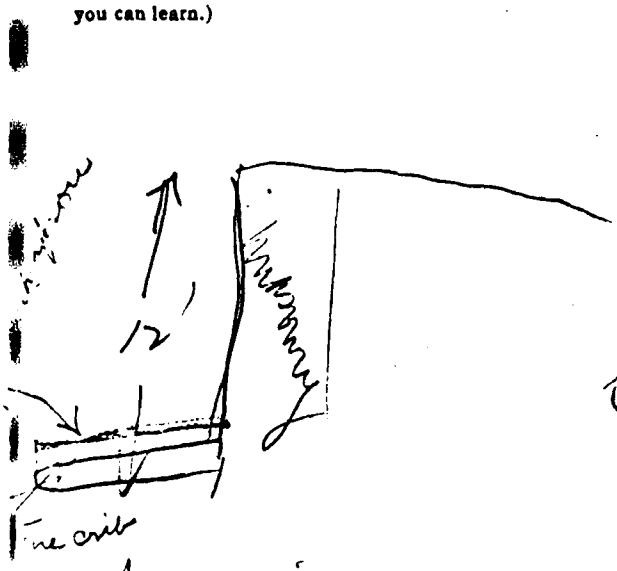
Reported by L A Perrin
(Signature)

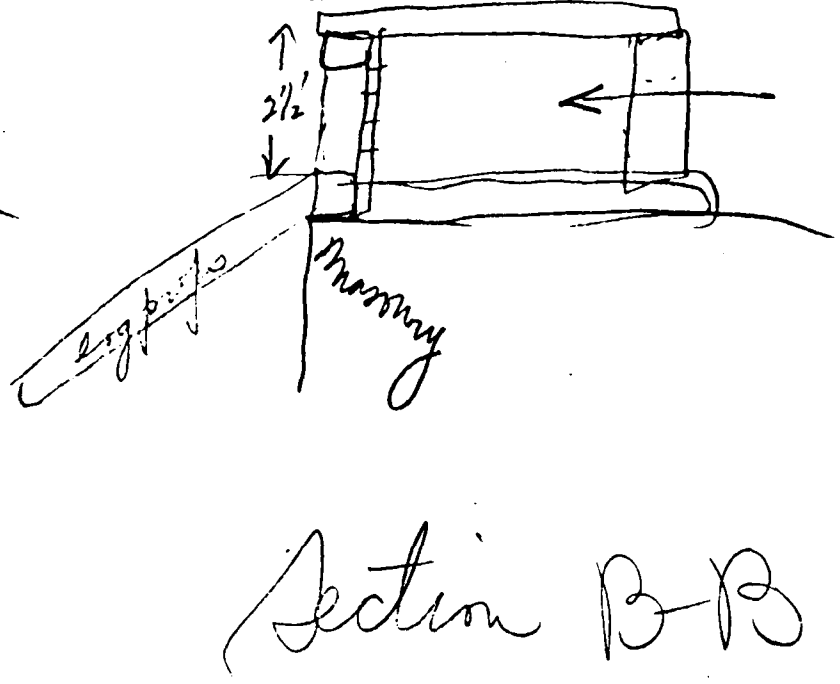
(Address—Street and number, P. O. Box or R. F. D. route)

(Name of place)

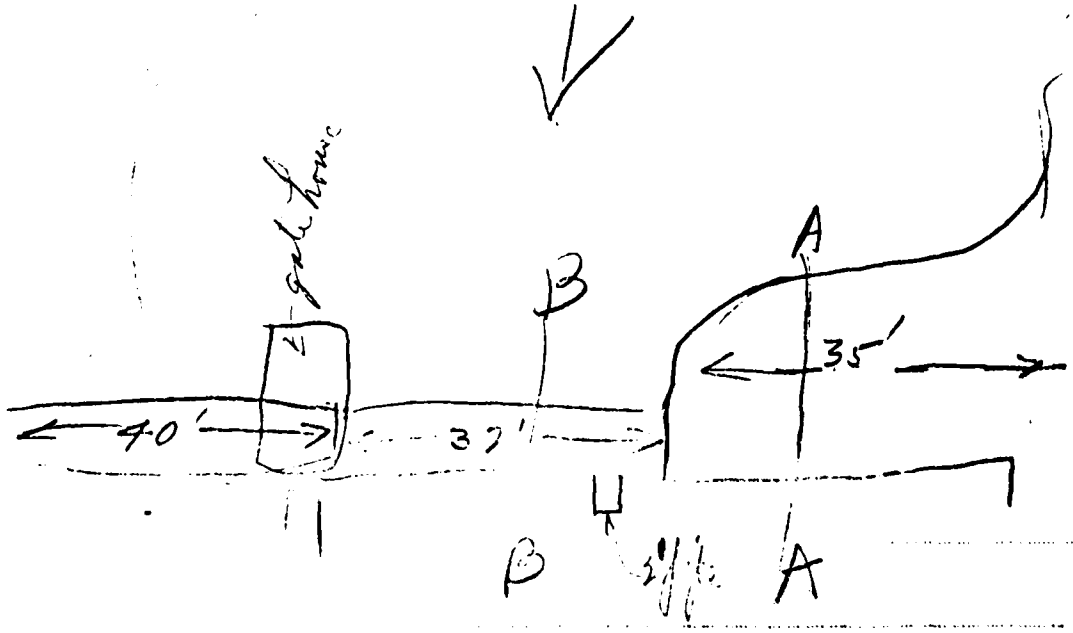
(SEE OTHER SIDE)

(In the space below, make one sketch showing the form and dimensions of a cross-section through the spillway or waste-weir of this dam, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)





(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.



Sept 15-16. Fair Condition A R Mayhew

Acc. 38a

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

204 – 641 UH

DAM REPORT

June 19 (Date), 1917

CONSERVATION COMMISSION,

DIVISION OF INLAND WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the Faxon's Dam — Map 204 – 641 and 643, Dam.

This dam is situated upon the Outlet Creek of Loon Lake (Give name of stream)

in the Town of Chester Town, Chester County,

about 3 miles (State distance) from the Village or City of Chester Town.

The distance up (Up or down) stream from the dam, to the Loon Lake (proper) (Give name of nearest important stream or of a bridge),

is about ½ mile (State distance).

The dam is now owned by W. H. Faxon, Chester Town, N. Y. (Give name and address in full)

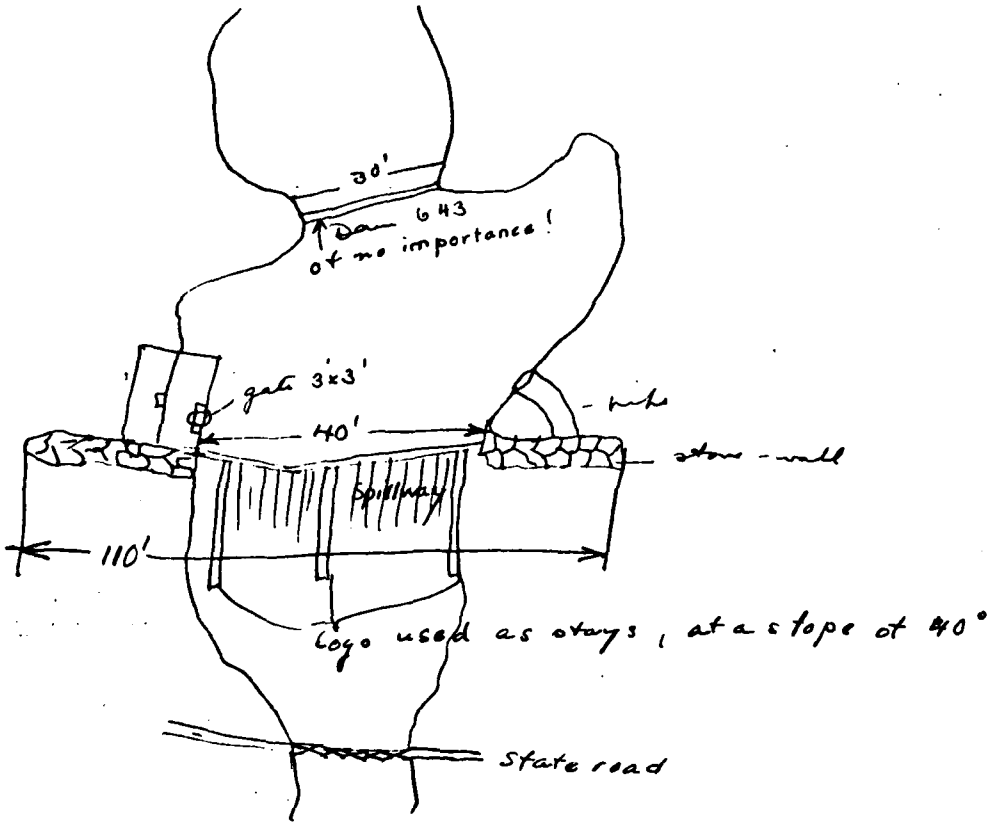
and was built in or about the year —, and was extensively repaired or reconstructed during the year —.

As it now stands, the spillway portion of this dam is built of timber (State whether of masonry, concrete or timber)

and the other portions are built of masonry, and timber with rock fill (State whether of masonry, concrete, earth or timber with or without rock fill)

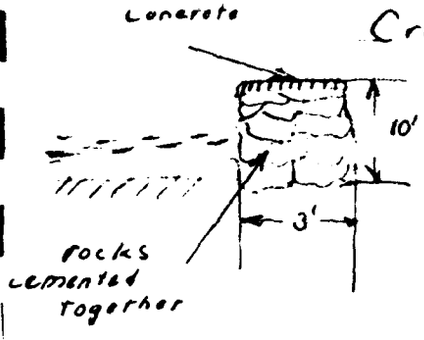
As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is rock and small stone and under the remaining portions such foundation bed is natural.

(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.)

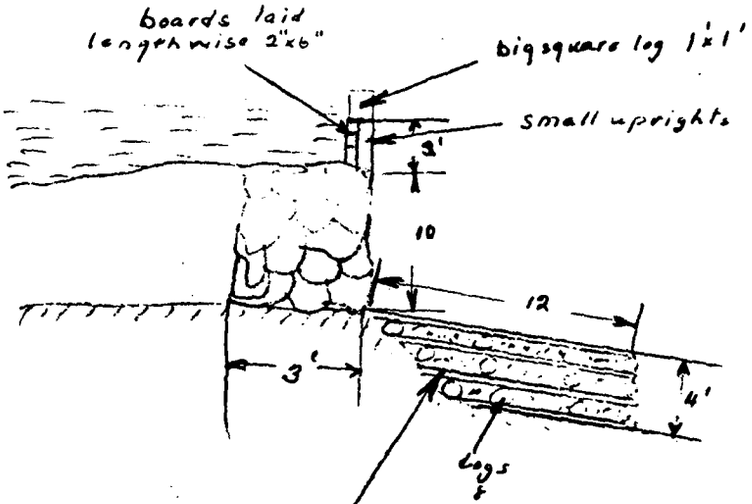


(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)

Cross-section of Dam



Another cross-section of Dam



This is spillway. It consists of flat boards nailed next to each other to logs laid cross-wise. The boards are most all washed away and the logs are rotted

There is no abutment. Natural rock embankment prevents water from flowing.

The total length of this dam is 110 feet. The spillway or waste-weir portion, is about 40 feet long, and the crest of the spillway is about 14 feet below the top of the dam.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: There is one gate which leads the water to a neighboring house where it is used.

At the time of this inspection the water level above the dam was 14 ft. 4 in. ~~below~~ above the crest of the spillway.

(State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks which you may have observed.)

This dam is in poor condition. Leaks are abundant and it requires immediate attention. It has given away, probably due to floods. In speaking to one land-owners on Loon Lake I find that because of the excess over-flow of the water over the dam the whole of the fish which the conservation commission puts in practically dies, as it is washed over the dam and hence, the lake looses its fish as regularly as they are put in by the conservation commission. The dam needs re-building. A good solid dam which would hold the level of the water at Loon Lake equal at all times is something which is wished for by all the dwellers of this neighborhood.

Reported by Willard Botsford
(Signature)

Conservation Commission Albany, N.Y.
(Address - Street and number, P. O. Box or R. F. D. route)

Saratoga, N.Y.
(City or town)

Form W51. 5-12-16-2000 (16-10755) Acc. 38a

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

DAM REPORT

S-204-No 641 U.H. July 14 (Date), 1920

CONSERVATION COMMISSION,

DIVISION OF WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the Parker Dam Loon Lake Outlet Dam.

This dam is situated upon the Outlet of Loon Lake (Give name of stream)

in the Town of Chester, Warren County,

about ..... (State distance) from the Village or City of .....

The distance down (Up or down) stream from the dam, to the State Rd Bridge (Give name of nearest important stream or of a bridge),

is about 100 ft. (State distance)

The dam is now owned by Mr. W.H. Faxon, Chestertown, N.Y. (Give name and address in full)

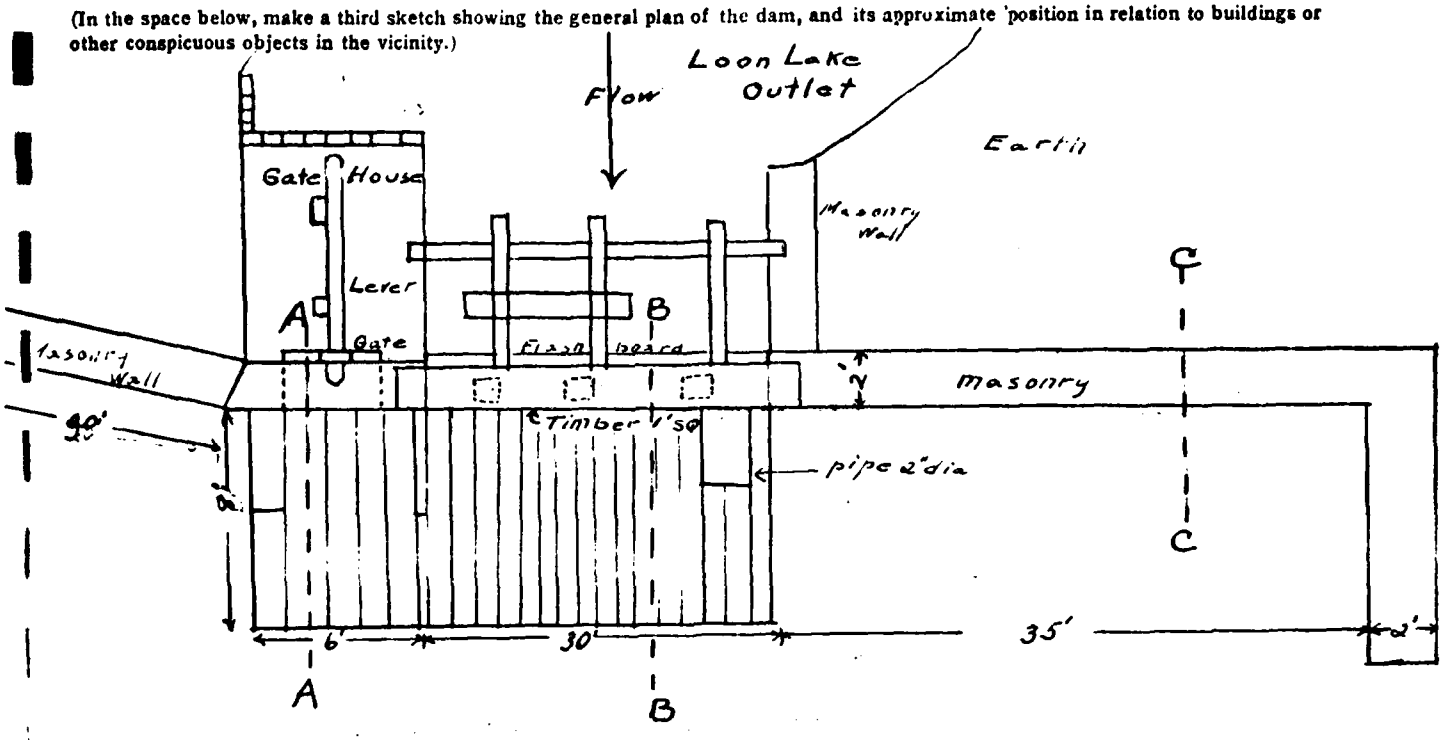
and was built in or about the year 18—, and was extensively repaired or reconstructed during the year ——— and is used for

As it now stands, the spillway portion of this dam is built of Timber (State whether of masonry, concrete or timber)

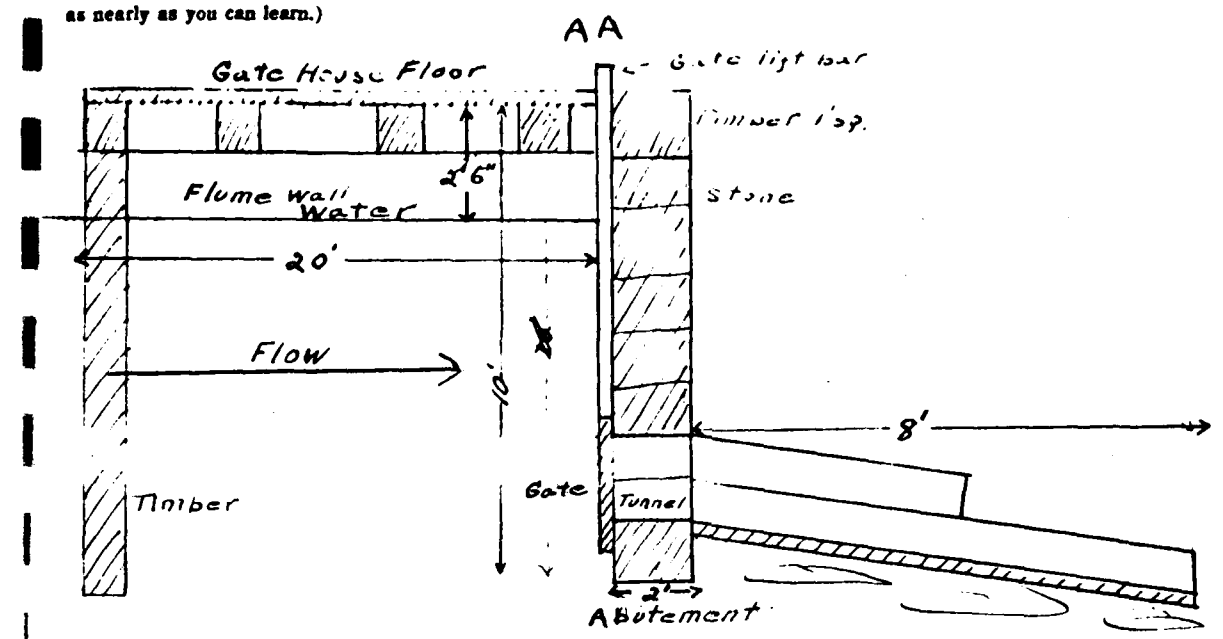
and the other portions are built of Masonry (State whether of masonry, concrete, earth or timber with or without rock fill)

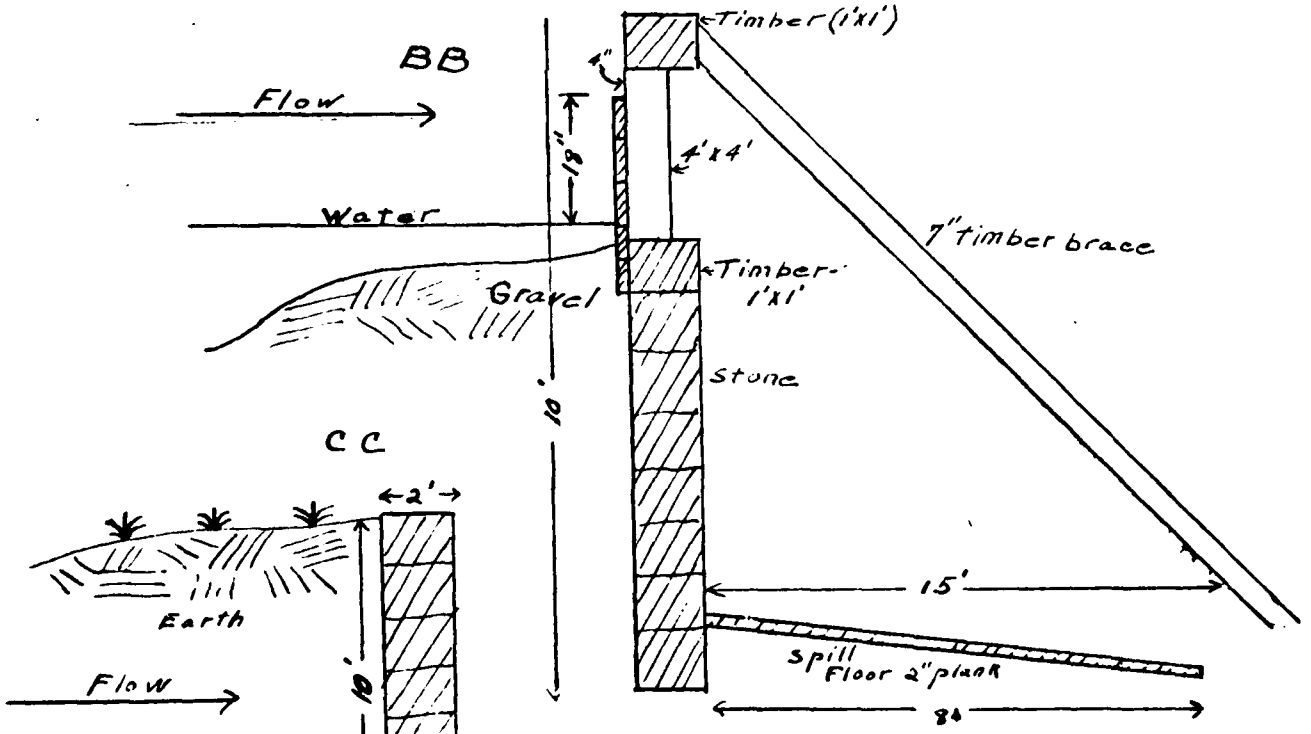
As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is Gravel and under the remaining portions such foundation bed is "

(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.)



(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam and outline the abutment, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)





The total length of this dam is 90 feet. The spillway or waste-weir portion, is about 40' feet long, and the crest of the spillway is about 2 feet below the abutment.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: One discharge tunnel 3'x2'; one 35' spillway

At the time of this inspection the water level above the dam was ft. 18 in. below ~~above~~ the crest of the spillway. Water discharging thru tunnel

(State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks or erosions which you may have observed.)

Reported by Richard V. Dram
(Signature)

Tuxedo Park, N.Y.
(Address—Street and number, P. O. Box or R. F. D. route)

(Name of place)

HOMER A. HARVEY, M. D.
WALKER BLOCK
BATAVIA N. Y.

September
Tenth
1 9 2 0

Conservation Commission,
Albany.

Gentlemen;

I desire to call to yout attention a matter that I feel should come under your jurisdiction.

There exists a state of affairs at Loon Lake, 5 miles north of Chestertown, Warren County, that is very annoying to the residents on its shores, as well as to the numerous transient summer visitors. It appears that Mr. Will Faxon, of Chestertown, acquired water rights on the Lake years ago, before there were any residents on the Lake to be discommoded. The power derived from that source he has used in the past for a grist mill at Chestertown. Of recent years he has added an electric lighting plant for supplying the town. He has a reservoir near his mill, fed from the Lake through a dam at the outlet. Ostensibly the idea is to keep this reservoir full, as he uses from it for power purposes, and to draw from the Lake only when his reserve of water becomes low. He has a dam at the outlet, which is so arranged that by removing successively board after board, he can continue to draw off water as the level of the Lake falls.

Now, here is the way this arrangement works in actual practice. His dam at the mill, at the lower end of the reservoir, is old and decrepit, and leaks badly. Water is constantly allowed to waste there that does him no good, and does great harm to the Lake by pulling down the level. I am told that he does very little mill business there now, and that his only use for water power is for operating the electric plant. It seems that a small amount of water would suffice for that; yet the sluices at the outlet are constantly open and the water runs out freely 24 hours a day. I left the Lake two days ago; at that time the level was down 6 feet below high water, and it was falling apparently six or eight inches a week.

September 14, 1920.

Homer A. Harvey, M. D.,
Walker Block,
Batavia, N. Y.

My dear Doctor Harvey:

Your letter of the 10th instant relating to Loon Lake near Chestertown, is at hand and we have read it with interest.

It is entirely possible that more economical use could be made of the water from Loon Lake and that such use would be more in accord with the ideals of this Commission. As State officers, we can proceed, however, toward the attainment of our ideals only in accordance with law, and we do not know of any law under which the riparian owner can be compelled to make more efficient use of his property.

It may be possible that Loon Lake has now become more valuable for recreation purposes than for water storage purposes, in which case the logical course would be for the owners of the shores of the lake to unite together and purchase the water power privilege.

As to the bad health conditions, the State Department of Health would have jurisdiction.

Yours very truly,

GEO. D. PRATT, Commissioner,

By

Division Engineer.

AHP-B.
3

Form E-41. 7-12-40-500 (11-83) 515-B

STATE OF NEW YORK

DEPARTMENT OF PUBLIC WORKS

DIVISION OF ENGINEERING

ALBANY

Received Aug. 25, 1941 Dam No. 641

Disposition Aug. 27, 1941 Watershed Upper Hudson

Foundation inspected.

Structure inspected

Application for the ~~Construction or~~ Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 948 of the Conservation Law (see third page of this application) for the approval of specifications and detailed drawings, marked Plans for Repairing & Reinforcing Dam at outlet of Loon Lake, Town of Chester, Warren Co., N.Y., July 15-1941 herewith submitted for the XXXXXXXXXX / reconstruction of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about September 1-1941 (Date)

1. The dam will be on outlet of Loon Lake flowing into Schroon River in the town of Chester County of Warren and 2 miles westerly of Chestertown on N.Y. State Highway, Route 9 (Give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)
2. Location of dam is shown on the North Creek quadrangle of the United States Geological Survey.
3. The name of the owner is Howard B. Swan
4. The address of the owner is Chestertown, N.Y.
5. The dam will be used for maintaining a water level in Loon Lake
6. Will any part of the dam be built upon or its pond flood any State lands? No
7. The watershed above the proposed dam is 13 +or- square miles.
8. The proposed dam will create a pond area at the spillcrest elevation of 600 +or- acres and will impound ? cubic feet of water.

9. The maximum height of the proposed dam above the bed of the stream is 14 feet 6 inches.

10. The lowest part of the natural shore of the pond is 5 feet vertically above the spillcrest, and everywhere else the shore will be at least 10 feet above the spillcrest.

11. State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam possibly to some roads and buildings.

12. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, granite, shale, slate, limestone, etc.) Imbedded gravel & boulders in hardpan material

13. Facing downstream, what is the nature of material composing the right bank?

Similar to material in bed

14. Facing downstream, what is the nature of the material composing the left bank?

Similar to material in bed

15. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing effect of exposure to air and to water, uniformity, etc. Bed & banks uniformly of boulders and gravel imbedded in material of hardpan nature - resistant to erosion - apparently impervious.

16. Are there any porous seams or fissures beneath the foundation of the proposed dam? No

17. WASTES. The spillway of the above proposed dam will be 32'8" feet long in the clear; the waters will be held at the right end by a Concr.& masonry structure backed by timber crib the top of which will be 4 feet above the spillcrest, and have a top width of 2+ feet; and at the left end by a Concr.& masonry structure backed by timber crib the top of which will be 4 feet above the spillcrest, and have a top width of 2+ feet.

18. The spillway is designed to safely discharge 800+or- cubic feet per second.

19. Pipes, sluice gates, etc., for flood discharge will be provided through the dam as follows:

2'x2'6" box opening, as now existing, extended through new spillway section and controlled by present sluice gate.

20. What is the maximum height of flash boards which will be used on this dam? 2 feet

21. APRON. Below the proposed dam there will be an apron built of logs and boulders, 38 feet long across the stream, 16 to 20 feet wide and 1 to 2 feet thick.

22. Does this dam constitute any part of a public water supply? No.

INSTRUCTIONS

Read carefully on the third page of this application the law setting forth the requirements to be complied with in order to construct or reconstruct a dam.

Each application for the construction or reconstruction of a dam must be made on this standard form, copies of which will be furnished upon request to the Chief Engineer, Division of Engineering, Department of Public Works, Albany, N. Y. The application must be accompanied by three sets of plans, and specifications. The information furnished must be in sufficient detail in order that the adequacy and safety of the dam can be determined. In cases of large and important dams assumptions made in calculating pressures and stability should be given.

Samples of materials to be used in the dam and of the material on which the dam is to be founded may be asked for, but need not be furnished unless requested.

If the dam constitutes a part of a public water supply, application should be made to the Water Power and Control Commission under Article XI of the Conservation Law.

An application for the construction or reconstruction of a dam must be signed by the prospective owner of the dam or his duly authorized agent. The address of the signer and the date must be given as provided for on the last page of the application form.

SECTION 948 OF THE CONSERVATION LAW

§ 948. Structures for impounding water; docks, piers, wharfs and other structures in waters. No structure for impounding water and no dock, pier, wharf or other structure used as a landing place in waters shall be erected or reconstructed by any public authority or by any private person or corporation, without notice to the superintendent of public works, nor shall any such structure be erected, reconstructed or maintained without complying with such conditions as the superintendent of public works may by order prescribe for safeguarding life or property against danger therefrom. No order made by the superintendent of public works shall be deemed to authorize any invasion of any property rights, public or private, by any person in observing the requirements of such order. The superintendent of public works shall have power, whenever in his judgment public safety shall so require, to make and serve an order, setting forth therein his findings of fact and the danger therefrom, directing any person, corporation, officer or board, constructing, maintaining or using any structure hereinbefore referred to, either remove the said structure or to repair or reconstruct the same and within reasonable time and in such manner as shall be specified in such order, and it shall be the duty of every such person, corporation, officer or board, to obey, observe and comply with such order and with the conditions prescribed by the superintendent of public works for safeguarding life or property against danger therefrom and every person, corporation, officer or board failing, omitting or neglecting so to do, or who hereafter erects or reconstructs any such structure hereinbefore referred to without submitting to the superintendent of public works and obtaining his approval of plans and specifications for such structures when required so to do by his order or hereafter fails to remove, erect or to reconstruct the same in accordance with the plans and specifications so approved shall forfeit to the people of this State a sum not to exceed five hundred dollars to be fixed by the court for each and every offense; every violation of any such order shall be a separate and distinct offense, and, in case of a continuing violation, every day's continuance thereof shall be and be deemed to be a separate and distinct offense. Such order shall not contain any provision to compel the owner to make repairs or proceed with reconstruction as specified in this section by any type of construction other than that of the dam itself. In addition to said forfeiture upon the violation of any such order, the superintendent of public works shall have power to enter upon the lands and waters where such structures are located, for the purpose of removing, repairing or reconstructing the same, and to take such other and further precautions which he may deem necessary to safeguard life or property against danger therefrom. In removing, repairing and reconstructing such dam the superintendent shall not deviate from the method, manner or specifications contained in the original order. The superintendent of public works shall certify the amount of the costs and expenses incurred by him for the removal, repair or reconstruction of such, or in anywise connected therewith, to the board of supervisors of the county or counties in which the said lands and waters are located, whereupon it shall be the duty of such board of supervisors to add the amount so certified to the assessment rolls of such locality or localities as a charge against the real property upon which the dam is located designated or described by the superintendent of public works as charged thereupon, and to issue its warrant or warrants for the collection thereof. Thereupon it shall become the duty of such board of supervisors through the proper officers to collect the amount so certified in the same manner as other taxes are collected in such locality or localities, and when collected to pay the same

to the superintendent of public works who shall thereupon pay the same into the state treasury. Any amount so levied shall thereupon become and be a lien upon the real property affected thereby, to the same extent as any tax levy becomes and is a lien thereon.

Any person in interest may, within thirty days from the service of any such order, appeal to the supreme court to determine the reasonableness of such order. At any time during such appeal to the supreme court upon at least three days' notice, the party appealing may apply for an order directing any question of fact to be tried and determined by a jury, and the court shall thereupon cause such question to be stated for trial accordingly and the findings of the jury upon such question shall be conclusive. Appeals may be taken from the supreme court to the appellate division of the supreme court and to the court of appeals in such cases, subject to the limitations provided in the civil practice act.

This section shall not apply to a dam where the area draining into the pond formed thereby does not exceed one square mile, unless the dam is more than ten feet in height above the natural bed of the stream at any point or unless the quantity of water which the dam impounds exceeds one million gallons; nor to a dock, pier, wharf or other structure under the jurisdiction of the department of docks, if any, in a city of over one hundred and seventy-five thousand population. This section as hereby amended shall not impair the effect of an order heretofore made by the conservation commission or commissioner under this section prior to the taking effect of chapter four hundred and ninety-nine of the laws of nineteen hundred and twenty-one, nor require the approval by the superintendent of public works, of plans and specifications theretofore approved by such commission or commissioner under this section.

The foregoing information is correct to the best of my knowledge and belief, and the construction will be carried out in accordance with the approved plans and specifications.

Howard B Swan, Owner

By....., authorized agent of owner.

Address of signer Chestertown, New York Date July 16-1941

Chestertown, N.Y.
July 17-1941

CHIEF ENGINEER,
Division of Engineering
N.Y. STATE DEPT. of PUBLIC WORKS

Dear Sir:-

I am herewith submitting for your approval plans & specifications, prepared by Ernest L. H. Meyer, C.E. of Glens Falls, N.Y., for the reconstruction and reinforcing of the dam at the outlet of Loon Lake in the Town of Chester, Warren County. I trust these will be found in order and acceptable.

These plans and specifications are to supersede the plans (consisting of 3 sheets) and specifications for the construction of a dam at the outlet of Loon Lake, Town of Chester, Warren County, N.Y., prepared by George F. Chism, C.E. & Surveyor of Lake George, N.Y., and dated January 10-1941.

I would appreciate it greatly if your notice of approval may be issued in the very near future so that this work may be immediately started and completed during the existing period of dry weather and low water.

Yours very truly,

Howard B Swan
OWNER.

S/em

Jan. 22, 1941

SPECIFICATIONS

for

REPAIRS AND REINFORCEMENT

OF THE LOWER DAM

at the Outlet of

LOON LAKE

Town of Chester, Warren County, New York.

ERNEST L. H. MEYER
Civil Engineer
Glens Falls
N. Y.

GENERAL SPECIFICATIONS

1. DEFINITIONS: Whenever, in these specifications, the word "Owner" is used, it shall be mutually understood to refer to Howard B. Swan, Chestertown, N. Y.

Whenever, in these specifications, the work "Contractor" is used, it shall be mutually understood to refer to Kingsbury Construction Company, Hudson Falls, N. Y.

Whenever, in these specifications, the word "Engineer" is used, it shall be mutually understood to refer to Ernest L. H. Meyer, of Glens Falls, New York.

2. COMMENCEMENT: The Contractor shall commence the work within days from the date of the receipt of notification form the Owner.

3. RATE OF PROGRESS: The Contractor shall maintain a rate of progress which, in the opinion of the Engineer, is necessary for the completion of the work within the time specified and agreed upon in the proposal or stipulated in the contract.

4. WORKMEN: The Contractor shall employ only competent workmen to perform the several parts of the work assigned to them and, whenever, in the opinion of the Engineer, any man on the work is incompetent for the particular work he may have assigned to him to perform, or if he is disorderly, or is unfaithful, the Contractor shall, upon notice from the Engineer, remove the incompetent workman from the work he has been considered incompetent to perform, and shall discharge from the work any who may have been considered disorderly, or unfaithful, and shall not again employ them on the work.

5. METHODS AND APPLIANCES: The Contractor shall use such methods and appliances for the performance of the work in all its operations connected with the contract as will insure a satisfactory quality of work and rate of progress which will, in the opinion of the Engineer, secure a satisfactory quality of work and a completion of the contract within the time stipulated in the contract.

6. FINAL ESTIMATE: Whenever, in the opinion of the Engineer, the work to be performed under the contract shall have been completely performed on the part of the Contractor, the Engineer shall proceed with all due diligence, to make out a final estimate of the sum then due the Contractor.

7. DISCHARGE OF CLAIMS: Before final payment is made to the Contractor by the Owner, the Contractor shall furnish the Owner with satisfactory evidence that all bills and accounts for all labor and services, for all materials used in the structure of work done, or consumed in the processes of construction or work done, for the use or rental of all tools and equipment, for the transportation of workmen or of materials or tools or equipment, to or from the site of the work, or used or employed in or on the structure or work, or for any fees, dues, royalties or charges for the use of any patented device or process, have been fully paid and discharged.

8. FINAL PAYMENT: Within ten days after the certification of the final estimate by the Engineer, the Owner will pay to the Contractor the amount thereby found to be due the Contractor, EXCEPTING therefrom such sum or sums as may be lawfully retained under any provisions of the contract.

9. CLAIMS: The Contractor shall not be entitled to any claim for damages or for any hindrance or delay from any cause whatever during the progress of the work, or for any portion thereof, but such hindrance or delay may entitle the Contractor to such extension of time for the completion of the contract as may be determined by the Engineer, provided the Contractor shall give to the Engineer due notice in writing of the cause of such detension.

10. LOSSES: The Contractor shall not be allowed any claim for losses arising from any unforseen causes of obstructions or encumberances in the performance of the contract which may be encountered during the prosecution of the work, unless it is conclusively proven that such loss, obstruction or encumberance is the result of the omission or of the commission of an act of the Owner causing such loss, obstruction or encumberance.

11. INJURY AND DAMAGE: The Contractor will be held responsible for any and all materials or work to the full amount of the payments thereon, and the Contractor will be required to make good, at his own proper cost and expense, any injury or damage which said materials or work may sustain from any cause whatever, before final acceptance of the work.

12. INSURANCE: The Contractor shall indemnify the Owner, and the officers and agents thereof, from all claims, suits, actions and proceedings of every name and nature that may arise from the operations of the performance of the work to be done under the contract, and the Contractor shall secure and pay for at his own proper cost and expense, all policies of insurance covering workmen's compensation, public liability, contingent liability and such other insurance as the laws of the State may require or as may be stipulated in the contract.

13. PERSONAL ATTENTION: The Contractor shall give such personal attention to the work and to its faithful performance as may, in the opinion of the Engineer, be reasonable and just; and the Contractor shall not assign the work or any part thereof, or any of the orders payable under the contract, without the written consent of the Owner.

14. SUB-CONTRACTS: No sub-contract shall under any circumstances relieve the Contractor of his obligations and liabilities under the contract.

15. ABANDONMENT OR ASSIGNMENT: If the work to be done under this contract shall be abandoned, or sub-let, or assigned by the Contractor, or any of the money or orders payable thereunder shall be assigned, otherwise than as herein provided, the Owner shall have the right to notify the Contractor to discontinue all work or any part thereof under the contract, or otherwise; and the Owner shall thereupon have the right to employ by contract or by other methods, and in such manner and at such prices as the Owner may deem necessary to use to complete the work stipulated in the contract, and to secure proper materials for the completion of the work, and to charge the expense of all such labor, tools and materials to the Contractor; and the expenses so charged shall be deducted from and paid out of such moneys as may be or would become due to the Contractor under the contract.

16. CONSTRUCTION SHEDS, STOREHOUSES, ETC. The Contractor may build such sheds, storehouses, etc., as are necessary for the work, at his own proper cost and expense; but the location of such sheds, etc., shall first be approved by the Engineer.

17. DRAINAGE: Where the natural drainage of the site of the work may be interfered with by the operations of the Contractor, he shall maintain provision for such surface drainage during the progress of the work, and will be held liable for all damage caused by his neglect to comply with this provision.

18. JOINING WORK: The Contractor is required, so far as possible, to so arrange his work and to so dispose of his materials as will not interfere with work that may be done or in progress by the Owner or by other Contractors whom the Owner may employ. The Contractor will be required to join his work, wherever it may become necessary, with that of others in a proper manner, and in accordance with the spirit of the plans and specifications, and to perform his work in proper sequence in relation to that of others, as may be directed by the Engineer.

19. DEFECTIVE WORK: Defective work or materials may be condemned at any time by the Engineer, before the final acceptance of the work; and when such work or materials have been so condemned, it shall be immediately removed from the site or taken down and rebuilt in accordance with the plans and specifications. In case the Contractor shall neglect or refuse to remove such condemned or rejected materials or work after a written notice to do so has been issued by the Engineer and delivered to the Contractor or to his foreman or head man on the work, such defective or condemned work or materials shall be removed or replaced by the Owner at the expense and cost charged to the Contractor.

20. CONDEMNATION OR REJECTION: Failure or neglect of the Engineer, or of his inspectors or other authorized representatives, to condemn or to reject bad or inferior work or materials shall not be construed to imply acceptance of such work or materials if it becomes evident at any time prior to final acceptance of the work and the release of the Contractor by the Owner; neither shall it be construed as barring the Owner, at any subsequent time, from recovery of damages of of such sum of money as may be needed to rebuilt anew all portions of the work in which fraud was practiced or improper materials or improperly installed work is hiddan, whenever found.

21. CLEANING UP: When the work is completed, all of the surrounding grounds shall be cleared of all rubbish caused the the operations of the Contractor, and shall be left in a neat and presentable condition.

22. FOREMANSHIP: At all times, during the progress of the work, a foreman, or head man, shall be on the site of the work, and there shall also be a copy of the plans and specifications in his care and possession. Instructions given to, or notices served upon, such foreman, or head man, shall be considered as having been given to, or served upon, the Contractor.

23. CHECKING DIMENSIONS: The Contractor shall check all leading dimensions as a whole and in detail and shall become responsible for the exact position of all elevations and parts of the work as shown on the plans or as instructed by the Engineer.

24. EXTRA WORK: No claims for extra work or extra materials will be allowed in any event, the price bid for the work being accepted for all the portions thereof to be done.

25. INTERPRETATION: The contract, the plans, and the specifications are at all times subject to the interpretation of the Engineer in the following details:

(a) Where the meaning is uncertain or obscure.
(b) As to what is implied beyond that which is specifically described.
(c) In case of discrepancies between plans and specifications.
(d) In case changes of plans or methods of work are afterward decided upon.

26. READING OF THE PLANS AND SPECIFICATIONS: The Contractor shall read every clause of these specifications and shall examine every sheet of the plans, and he shall, as a precedent condition to the signing the contract, at all times during the progress of the work, be considered as having done so.

Work to be performed under these specifications shall consist of the removal of the existing timber-work in the present spillway; the construction of a new concrete spillway; the raising of the masonry walls by means of a concrete cap; the construction of two buttresses at each end of the spillway section; the reinforcement of the present dam structure by placing a cobble stone fill in front of same from each end of the spillway to each end of the present dam; the removal of the existing gate-house and the construction of a new one in its' place; the stoppage of the leakage through the existing discharge flume; the placing of log stone-filled apron in front of the spillway section and the cleaning up of the area around the dam at the completion of the contract, to leave same in a neat and orderly appearance; all in accordance with these specifications and plans approved by the New York State Department of Public Works.

DETAIL SPECIFICATIONS

1. The entire area for the spillway, buttress walls and stabilizing cobble-fill shall be cleared of all trees, bushes and other vegetable growth above the ground surface, and all foundations and roots of trees shall be removed from below the gound surface.

2. Within the area to be occupied by the buttresses and the spillway, all earth and other pervious material shall be removed by excavation down to impervious material that will tend to exude any percolation, seepage or other passage of water from the pool above the dam to the down-stream side thereof.

3. When all earth, vegetation and other deleterious material has been excavated from the area to be occupied by the buttresses and spillway, and the exposed impervious material has been inspected and approved by the Engineer, the concrete for these structures may be placed.

4. Before any concrete is poured, all loose material, stone fragments, dust and other foreign material shall be removed from the foundation or trenches and that shall be thoroughly washed with clean water.

5. After the concrete portions of the structures, against which filling is to be placed, have, in the opinion of the Engineer, become sufficiently hard to remove the forms, the filling may be deposited.

6. The cobble-stone fill against the dam at each end of the concrete spillway and buttresses shall be carried up simultaneously on both sides to prevent unequal or undue pressure against either end of the spillway structure and buttresses.

7. The concrete used in the spillway section, the buttresses and the cap, shall be composed of the following proportions of materials:

Materials	Proportions
Portland Cement.	5 bags to the cubic yard
Clean water.	50 gallons to the cubic yard.
Clean, dry sand.	13½ cubic feet to the cu. yd.
3/4" crushed stone or) 3/4" screened gravel)	27 " " " " " "

8. All concrete shall be thoroughly mixed by a suitable mechanical mixer and shall be deposited in the trenches or the forms on the foundations within twenty minutes from the time water is added to the mixture.

9. All concrete placed in the foundations and forms shall be thoroughly tamped and rodded in place to exude all air that might form voids in the finished concrete. The surface along the forms shall be thoroughly spaded so that when the forms are removed the finished concrete shall have a smooth and even surface.

10. Concrete for the footings in the trenches may be deposited without forms if the excavation conforms to and remains at the lines shown for their sizes and location on the plans.

11. Concrete for the buttresses and spillway section shall be placed in forms that have been properly prepared and placed to shape the structures to the dimensions shown on the plans. They shall be reasonably tight, and any knot holes or other openings that would permit fluid or other parts of the concrete mixture to seep through shall be covered and stopped. Care shall be taken to see that all form work is properly aligned and thoroughly braced to hold such alignment before any concrete is poured.

12. The term "bag" as applied to the measure of cement in the proportions given in paragraph 7 (above) shall be a package of the product of the cement manufacturer, brought to the site of the work in the original package bearing the label of the manufacturer, and shall contain one cubic foot of dry cement, weighing not less than 94 pounds, in a pulverized condition, free from hard lumps or solidified parts.

13. Whenever any cracks or fissures are encountered in the material under or at the sides of the excavation for the footings of the concrete parts of the structure, such cracks or fissures shall be grouted with a mixture of one part of Portland Cement to three parts of clean sand, made into a fluid paste by the addition of not more than five gallons of clean water to each bag of the cement used in the mixture. This grout or fluid paste shall be rammed or pressed into the crack or fissure by sufficient force to completely resist the admission of further grout.

14. All horizontal or vertical joints that may necessarily be caused during the placing of concrete, shall be 'keyed' with bevelled 2" x 4's of not less than 1-5/8" x 3" section.

15. Concrete shall be deposited in horizontal layers in not more than one foot in thickness and thoroughly rammed and rodded in place. If continuation of concreting is to be resumed at a vertical joint within thirty minutes from the time the joing was made, a key, as herein provided, shall be inserted.

16. Forms for concrete shall not be removed within forty-eight hours from the time that the last deposit of concrete has been placed in such form.

17. After the removal of forms for all concrete that has been placed in forms, the exposed surface of the concrete shall be kept wetted with clean water for such a length of time as may be required by the Engineer.

18. "Plums" (meaning rock fragments or boulders) not exceeding one cubic foot in volume may be permitted in certain parts of the concrete of the structure, but such 'plums' shall not contact each other, shall not come within six inches of the forms, shall not touch any reinforcement in the concrete, and the concrete shall cover every surface of the 'plum' in intimate contact. PLUMS SHALL NOT BE USED UNLESS PERMITTED BY EXPRESS CONSENT OF THE ENGINEER, AND THEN ONLY IN THE PARTS OF THE STRUCTURE IN WHICH THE ENGINEER MAY APPROVE THEIR USE.

19. All bars for reinforcement in concrete shall be mild steel, having a tensile stress of not less than 16,000 lbs. per square inch.

20. All bending of bars shall be done without heating -- known as "cold bending". The bending force shall be applied gradually so as not to distort or distress the fibers of the steel to a point of rupture.

21. Bars shall be cleaned of all free scale, either of mill or rust. A slight coating of rust which does not rub off freely under pressure of the hand will not cause rejection of or recleaning of the bar.

22. Bars shall be located in the forms substantially as shown on the plans and shall be securely held in place by metallic supports, spacers, wires, bar ties, or other proper devices to insure against displacement during the depositing and tamping of the concrete in the form.

23. Iron pipe sockets to receive the bars for holding the flashboards, shall be placed in the spillway sections as shown on the plans.

24. The planking for the flashboards shall be sound pine, spruce or fir, and of the dimensions as shown upon the plans.

25. Before the placing of any concrete or cobblestone walls, the Contractor shall repair and stop the leakage around the present sluice discharge.

26. The Gate-house shall be of the dimensions as shown upon the plans; shall be constructed of sound material and will consist of 2" x 4" sills, plates, studding and rafters. The sides will be covered with a novelty siding on the outside. A door, fitted with proper hardware, will be left in the westerly side. The roof rafters will be covered with shiplap, upon which will be placed composition slate shingles. Air vents will be left in the north and south end walls, properly cased and fitted, with a removable screen on the inside. The floor will be of two inch fir. The entire structure shall have two coats of paint on the outside.

27. The cobblestone fill against the existing dam, from the buttress of each end of the spillway to the end of the dam, shall be carefully placed on the slope, as shown on the plans. The larger stone shall be placed in the face and extra care shall be taken in placing these stones to form as close a bond between each succeeding stone as shall be possible to obtain with this class of material.

28. A log or timber apron shall extend down-stream from the spillway and shall consist of longitudinal logs or timbers spaced as shown on the plans, and tied together by a cross timber as shown on the plans. The spaces between the timbers shall be hand packed with as large stone as can be procured.

29. So that the entire operations may proceed with as little interference from water as possible, the Contractor may place a temporary coffer dam [illegible] to hold back the waters of Loon Lake and so permit him to drain the pond area between the two dams. This coffer dam shall be so securely constructed as to hold back and maintain at the existing level the waters of Loon Lake. Upon the completion of the contract the Contractor shall remove the coffer dam.

30. Under these plans and specifications the Contractor is required to furnish all materials, labor, necessary tools and machinery for the proper construction thereof. Upon completion of the contract and the acceptance by the Engineer, the Contractor shall clean up the site of all debris left as the result of the construction operations, and leave the site in a neat and orderly appearance.

Form E-61. 7-10-50-1M (D-111)
Ord. 7-05-73

STATE OF NEW YORK

DEPARTMENT OF PUBLIC WORKS

ALBANY

Received ..... Dam No. 204-1485

Disposition approved 12/7/1950 Watershed Upper Hudson R.

Foundation inspected .....

Structure inspected .....

Application for the ~~Construction or~~ Reconstruction of a Dam

Application is hereby made to the Superintendent of Public Works, Albany, N. Y., in compliance with the provisions of Section 948 of the Conservation Law (see third page of this application) for the approval of specifications and detailed drawings, marked AUXILIARY DAM, LOON LAKE, TOWN OF CHESTER, WARREN COUNTY, N.Y.,

herewith submitted for the { ~~construction~~ reconstruction } of a dam herein described. All provisions of law will be complied with in the erection of the proposed dam. It is intended to complete the work covered by the application about March 1, 1951.
(Date)

1. The dam will be on Loon Lake flowing into Schroon River in the town of Chester County of Warren and 300 feet northerly of bridge structure at station 182 + 97 on State Highway No. 691 (Routes 8 & 9) Sheet 6, RC-2486, Apr. 28, 1937.
(Give exact distance and direction from a well-known bridge, dam, village main cross-roads or mouth of a stream)

2. Location of dam is shown on the North Creek quadrangle of the United States Geological Survey.

3. The name of the owner is Town of Chester. (Park District)

4. The address of the owner is Eugene Rankin, Clerk of Town Board, Chestertown, N.Y

See Note. 5. The dam will be used for Maintaining water level in Loon Lake.

6. Will any part of the dam be built upon or its pond flood any State lands? No.

7. The watershed above the proposed dam is 14 square miles.

8. The proposed dam will create a pond area at the spillcrest elevation of 600 acres and will impound 100,000,000 cubic feet of water.

11. The lowest part of the natural shore of the pond is five feet vertically above the spillcrest, elsewhere else the shore will be at least five + feet above the spillcrest.

State if any damage to life or to any buildings, roads or other property could be caused by any possible failure of the proposed dam No.

12. The natural material of the bed on which the proposed dam will rest is (clay, sand, gravel, boulders, shale, slate, limestone, etc.) Gravel

13. Facing downstream, what is the nature of material composing the right bank? Gravel

Facing downstream, what is the nature of the material composing the left bank? Gravel

14. State the character of the bed and the banks in respect to the hardness, perviousness, water bearing, effect of exposure to air and to water, uniformity, etc. Satisfactory.

15. Are there any porous seams or fissures beneath the foundation of the proposed dam?

None observed.

16. WASTES. The spillway of the above proposed dam will be 29½ feet long in the clear; the waters will be held at the right end by a stone masonry wall the top of which will be 4 feet above spillcrest, and have a top width of 18 feet; and at the left end by a same which will be same feet above the spillcrest, and have a top width of same feet.

17. The spillway is designed to safely discharge 800 ✓ cubic feet per second. 5 × 11 = 57

18. Pipes, sluice gates, etc., for flood discharge will be provided through the dam as follows:

1 — 48 inch Corrugated Metal Sluice Pipe.

19. What is the maximum height of flash boards which will be used on this dam? None.

20. APRON. Below the proposed dam there will be an apron built of hand placed rock. across the stream, 40 feet wide and 2 + feet thick.

21. Does this dam constitute any part of a public water supply? No.

INSTRUCTIONS

Read carefully on the third page of this application the law setting forth the requirements to be complied with in order to construct or reconstruct a dam.

Each application for the construction or reconstruction of a dam must be made on this standard form, copies of which will be furnished upon request to the Department of Public Works, Albany, N. Y. The application must be accompanied by three sets of plans, and specifications. The information furnished must be in sufficient detail in order that the stability and safety of the dam can be determined. In cases of large and important dams assumptions made in calculating stresses and stability should be given.

Samples of materials to be used in the dam and of the material on which the dam is to be founded may be asked for, but need not be furnished unless reguested.

If the dam constitutes a part of a public water supply, application should be made to the Water Power and Control Commission under Article XI of the Conservation Law.

An application for the construction or reconstruction of a dam must be signed by the prospective owner of the dam or his duly authorized agent. The address of the signer and the date must be given as provided for on the last page of the application form.

SECTION 948 OF THE CONSERVATION LAW

§ 948. Structures for impounding water; inspection of docks; penalties. No structure for impounding water and no dock, pier, wharf or other structure used as a landing place on waters shall be erected or reconstructed by any public authority or by any private person or corporation without notice to the superintendent of public works, nor shall any such structure be erected, reconstructed or maintained without complying with such conditions as the superintendent of public works may by order prescribe for safeguarding life or property against danger therefrom. No order made by the superintendent of public works shall be deemed to authorize any invasion of any property rights, public or private, by any person in carrying out the requirements of such order. The superintendent of public works shall have power, whenever in his judgment public safety shall so require, to make and serve an order, setting forth therein his findings of fact and his conclusions therefrom, directing any person, corporation, officer or board, constructing, maintaining or using any structure hereinbefore referred to, either remove the said structure or to repair or reconstruct the same within such reasonable time and in such manner as shall be specified in such order, and it shall be the duty of every such person, corporation, officer or board, to obey, observe and comply with such order and with the conditions prescribed by the superintendent of public works for safeguarding life or property against danger therefrom, and every person, corporation, officer or board failing, omitting or neglecting so to do, or who hereafter erects or reconstructs any such structure hereinbefore referred to without submitting to the superintendent of public works and obtaining his approval of plans and specifications for such structures when required so to do by his order or hereafter fails to remove, erect or to reconstruct the same in accordance with the plans and specifications so approved shall forfeit to the people of this State a sum not to exceed five hundred dollars to be fixed by the court for each and every offense; every violation of any such order shall be a separate and distinct offense, and, in such case of a continuing violation, every day's continuance thereof shall be and be deemed to be a separate and distinct offense. Such order shall not contain any provision to compel the owner to make repairs or proceed with reconstruction as specified in this section by any type of construction other than that of the dam itself. In addition to said forfeiture upon the violation of any such order, the superintendent of public works shall have power to enter upon the lands and waters where such structures are located, for the purpose of removing, repairing or reconstructing the same, and to take such other and further precautions which he may deem necessary to safeguard life or property against danger therefrom. In removing, repairing and reconstructing such dam the superintendent shall not deviate from the method, manner or specifications contained in the original order. The superintendent of public works shall certify the amount of the costs and expenses incurred by him for the removal, repair or reconstruction aforesaid, or in anywise connected therewith, to the board of supervisors of the county or counties in which the said lands and waters are located, whereupon it shall be the duty of such board of supervisors to add the amount so certified to the assessment rolls of such locality or localities as a charge against the real property upon which the dam is located designated or described by the superintendent of public works as chargeable therewith, and to issue its warrant or warrants for the collection thereof. Thereupon it shall become the duty of such locality or localities through their proper officers to collect the amount so certified in the same manner as other taxes are collected in such locality or localities, and when collected to pay the same to the

superintendent of public works who shall thereupon pay the same into the state treasury. Any amount so levied shall thereupon become and be a lien upon the real property affected thereby, to the same extent as any tax levy becomes and is a lien thereon.

Any person in interest may, within thirty days from the service of any such order, appeal to the supreme court to determine the reasonableness of such order. At any time during such appeal to the supreme court upon at least three days' notice, the party appealing may apply for an order directing any question of fact to be tried and determined by a jury, and the court shall thereupon cause such question to be stated for trial accordingly and the findings of the jury upon such question shall be conclusive. Appeals may be taken from the supreme court to the appellate division of the supreme court and to the court of appeals in such cases, subject to the limitations provided in the civil practice act.

This section shall not apply to a dam where the area draining into the pond formed thereby does not exceed one square mile, unless the dam is more than ten feet in height above the natural bed of the stream at any point or unless the quantity of water which the dam impounds exceeds one million gallons; nor to a dock, pier, wharf or other structure under the jurisdiction of the department of docks, if any, in a city of over one hundred and seventy-five thousand population. This section as hereby amended shall not impair the effect of an order heretofore made by the conservation commission or commissioner under this section prior to the taking effect of chapter four hundred and ninety-nine of the laws of nineteen hundred and twenty-one, nor require the approval by the superintendent of public works, of plans and specifications theretofore approved by such commission or commissioner under this section.

The foregoing information is correct to the best of my knowledge and belief, and the construction will be carried out in accordance with the approved plans and specifications.

TOWN OF CHESTER, , Owner

By Harry B. Kasle, authorized agent of owner.

Address of signer Pottersville, N.Y. Date December 4, 1950.

5. Note:
Approximately 200 feet southerly (downstream) of the site of this proposed reconstruction, is a concrete dam through which there has developed two or three small leaks. The owner plans to put this structure in good repair in the Fall of 1951, at which time the replacement of the spillway in the old dam (approval herewith applied for) will act as a cofferdam, and during the interim as a safety measure for controlling the waters of Loon Lake; should the lower concrete dam fail, which from my investigation seems quite improbable.

N. E. Davis, P.E.,

RB	CTY	YR AP.	DAM NO.	INS. DATE	USE	TYPE
01	57	41	0C178-2 (2.04)	1970	002	4

AS BUILT INSPECTION

[1] Location of Sp'way and outlet	[1] Elevations
[1] Size of Sp'way and Outlet	[1] Geometry of Non-overflow section

[1] GENERAL CONDITION OF NON-OVERFLOW SECTION

[1] Settlement	[1] Cracks	[1] Deflections
[1] Joints	[1] Surface of Concrete	[1] Leakage
[1] Undermining	[1] Settlement of Embankment	[1] Crest of Dam
[2] Downstream Slope	[2] Upstream Slope	[1] Toe of Slope

[1] GENERAL COND. OF SP'WAY AND OUTLET WORKS

[1] Auxiliary Spillway	[1] Service or Concrete Sp'way	[1] Stilling Basin
[1] Joints	[1] Surface of Concrete	[1] Spillway Toe
[1] Mechanical Equipment	[1] Plunge Pool	[1] Drain

[1] Maintenance	[C] Hazard Class
[3] Evaluation	[34] Inspector

COMMENTS:

good shape

1. River Basin - Nos. 1-23 on compilation sheets
2. County - Nos. 1-62 Alphabetically
3. Year Approved -
4. Inspection Date - Month, Day, Year
5. Apparent use -
   1. Fish & Wildlife Management
   2. Recreation
   3. Water Supply
   4. Power
   5. Farm
   6. No Apparent Use
6. Type -
   1. Earth with Aux. Service Spillway
   2. Earth with Single Conc. Spillway
   3. Earth with Single non-conc. Spillway
   4. Concrete
   5. Other
7. As-Built Inspection - Built substantially according to approved plans and specifications

Location of Spillway and Outlet Works

1. Appears to meet originally approved plans and specifications.
2. Not built according to plans and specifications and location appears to be detrimental to structure.
3. Not built according to plans and specifications but location does not appear to be detrimental to structure.

Elevations

1. Generally in accordance to approved plans and specifications as determined from visual inspection and use of hand level.
2. Not built according to plans and specifications and elevation changes appear to be detrimental to structure.
3. Not built according to plans and specifications but elevation changes do not appear to be detrimental to structure.

Size of Spillway and Outlet Works

1. Appears to meet originally approved plans and specifications as determined by field measurements using tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

Geometry of Non-overflow Structures

1. Generally in accordance to originally approved plans and specifications as determined from visual inspection and use of hand level and tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

General Conditions of Non-Overflow Section

1. Adequate - No apparent repairs needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

ITLMS
For boxes listed on condition under non-overflow section.
1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.

1. Adequate - No apparent repair needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

Items) For boxes listed conditions listed under spillway and outlet works.
1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.
4. Dam does not contain this feature.

Maintenance

1. Evidence of periodic maintenance being performed.
2. No evidence of periodic maintenance.
3. No longer a dam or dam no longer in use.

(S.C.S.) Hazard Classification Downstream

CLASSIFICATION CORPS. ENGRS
(III)
(II)
(I)

1. (A) Damage to agriculture and county roads.
2. (B) Damage to private and/or public property.
3. (C) Loss of life and/or property.

Evaluation - Based on Judgment and Classification in Box Nos.

Evaluation for Unsafe Dam

1. Unsafe - Repairable.
2. Unsafe - Not Repairable.
3. Insufficient evidence to declare unsafe.

RIVER BASINS

(1) LOWER HUDSON
(2) UPPER HUDSON
(3) MOHAWK
(4) LAKE CHAMPLAIN
(5) DELAWARE
(6) SUSQUEHANNA
(7) CHEMUNG
(8) OSWEGO
(9) GENESEE
(10) ALLEGHENY
(11) LAKE ERIE
(12) WESTERN LAKE ONTARIO
(13) CENTRAL LAKE ONTARIO
(14) EASTERN LAKE ONTARIO
(15) SALMON RIVER
(16) BLACK RIVER
(17) WEST ST. LAWRENCE
(18) EAST ST. LAWRENCE
(19) RACQUETTE RIVER
(20) ST. REGIS RIVER
(21) HOUSATONIC
(22) LONG ISLAND
(23) OSWEGATCHIE
(24) GRASSE

COUNTIES

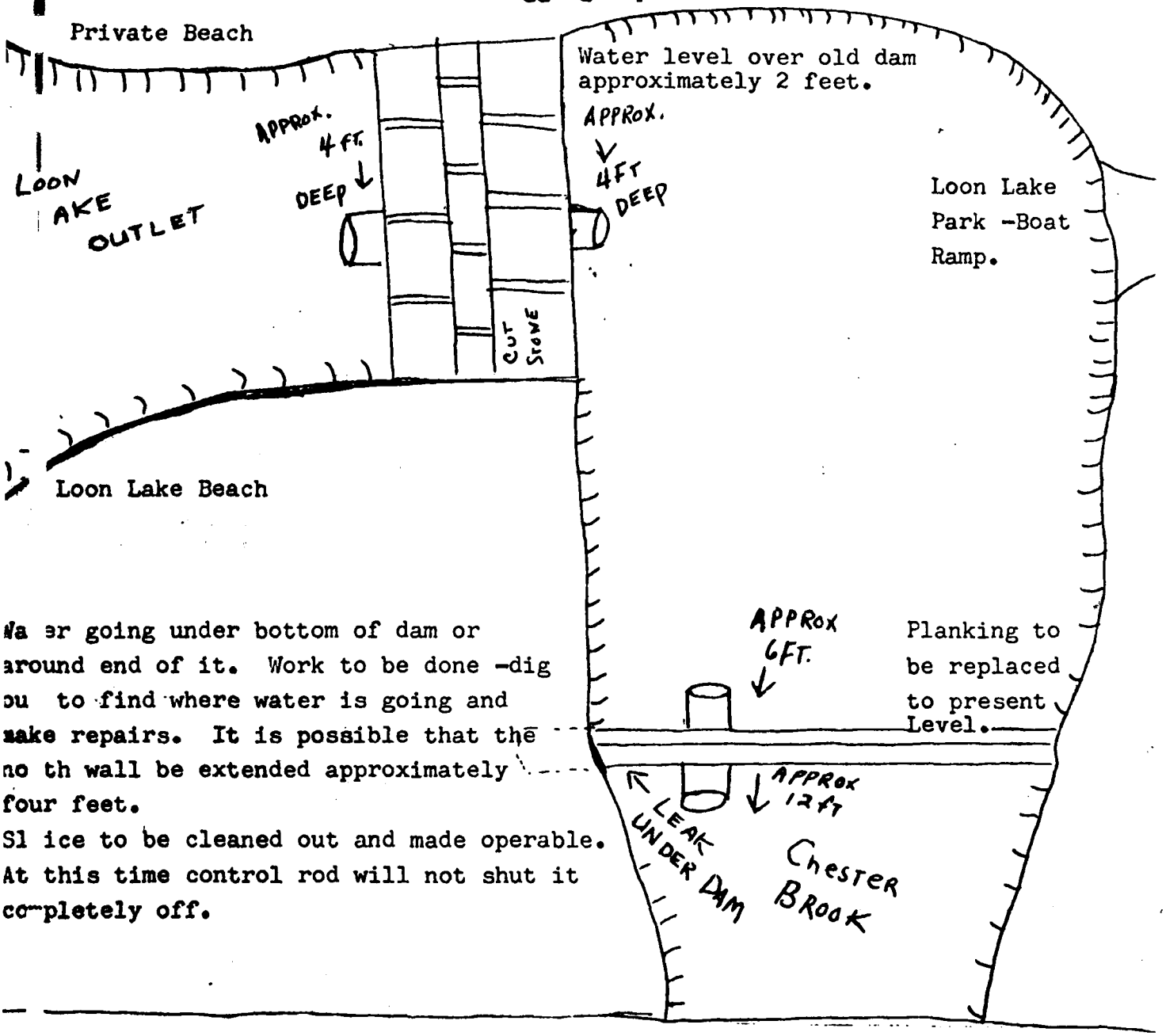
STATE NAME: NEW YORK

STATE ABBREVIATION: NY

STATE CODE: 36

CODE	COUNTY NAME
1	ALBANY
2	ALLEGANY
3	BRONX
4	BROOME
5	CATTARAUGUS
6	CAYUGA
7	CHAUTAUQUA
8	CHEMUNG
9	CHENANGO
10	CLINTON
11	COLUMBIA
12	CORTLAND
13	DELAWARE
14	DUTCHESS
15	ERIE
16	ESSEX
17	FRANKLIN
18	FULTON
19	GENESEE
20	GREENE
21	HAMILTON
22	HERKIMER
23	JEFFERSON
24	KINGS
25	LEWIS
26	LIVINGSTON
27	MADISON
28	MONROE
29	MONTGOMERY
30	NASSAU
31	NEW YORK
32	NIAGARA
33	ONEIDA
34	ONONDAGA
35	ONTARIO
36	ORANGE
37	ORLEANS
38	OSWEGO
39	OTSEGO
40	PUTNAM
41	QUEENS
42	RENSSELAER
43	RICHMOND
44	ROCKLAND
45	ST LAWRENCE
46	SARATOGA
47	SCHENECTADY
48	SCHOHARIE
49	SCHUYLER
50	SENECA
51	STEUBEN
52	SUFFOLK
53	SULLIVAN
54	TIOGA
55	TOMPKINS
56	ULSTER
57	WARREN
58	WASHINGTON
59	WAYNE
60	WESTCHESTER
61	WYOMING
62	YATES

Chestertown. After Labor Day the work is to be done by Town Employees, under the supervision of the Highway Department. These repairs require that the water be held back in Loon Lake until the main dam is repaired. This requires closing sluice pipe at old dam site and sand-bagging top of old dam.



Water going under bottom of dam or around end of it. Work to be done -dig out to find where water is going and make repairs. It is possible that the north wall be extended approximately four feet.
Sluice to be cleaned out and made operable. At this time control rod will not shut it completely off.

RT. 8 & 9 ← NORTH

BROOK

PERMIT SIGN

No. 557-04-1

has been issued to: Town of Chester

address: Chester Town N.Y.

for: Working in Chester Creek at the toe & face of Loon Lake Dam

under the Environmental Conservation Law,

- [x] Article 15, (Protection of Water)
- [ ] Article 24, (Freshwater Wetlands)
- [ ] Article 25, (Tidal Wetlands)
- [ ] Article 36, (Construction in Flood Hazard Areas)

New York State
Department of Environmental Conservation

W. A. Muermann
Permit Administrator

6 SEPT. 1977
Date Issued

31 DEC. 1977
Expiration Date

95-20-1 (9/75)
Formerly EA-93

New York State Department of Environmental Conservation

P.O. Box 220, Hudson St., Warrensburg, N.Y. 12885

Peter A. A. Berle,
Commissioner

September 6, 1977

Mr. Carl H. Roblee
Supervisor
Town of Chester
Box 423
Chestertown, New York 12817

Re: Loon Lake Dam

Dear Mr. Roblee:

A Memo of Understanding permit has been issued to work in Chester Creek to accomplish minor repairs to the toe and face of Loon Lake Dam. The permit will be subject to the following conditions:

1. A minimum flow shall continue to flow in the Creek during the project.

2. No uncured concrete shall enter the stream flow.

3. Fish trapped between the two dams shall be placed upstream into Loon Lake.

4. This permit does not allow any major dam reconstruction or structural changes such as spillway capacity changes.

Very truly yours,

W. A. Muermann

William A. Muermann
Environmental Analysis
Region 5

WAM:cm
Enc.
cc: R. Robert, E.C.O.
M. Hagadorn, F.R.
R. Wild

WARREN COUNTY DEPARTMENT OF PUBLIC WORKS

WARRENSBURG OFFICES
261 Main Street
Warrensburg, N.Y. 12885
Tel. 518-623-4141

Superintendent's Office
Highway Division
Parks and Recreation
Airport Administration
Equipment Maintenance
Engineering

FRED AUSTIN, P. E.
Supt. Public Works

ROGER GEBO
Dept. Supt. Public Works

MUNICIPAL CENTER OFFICES
Lake George, N.Y. 12845
Tel. 518-792-9951

Civil Defense Ext. 202
Buildings and Grounds Ext. 209
County Energy Office Ext. 202

WARREN COUNTY AIRPORT
County Line Road
Glens Falls, N.Y. 12801
Tel. 518-792-5995

September 18, 1978

Mr. Carl Roblee
Supervisor, Town of Chester
Chestertown, New York 12817

Re: Loon Lake Dam

Dear Carl,

In 1974, I looked at the dam and noted seepage under both wingwalls.

In 1977, the seepage had not significantly increased.

Last week, I looked at it again and feel the seepage under the westerly wingwall has increased to the point where it should be thoroughly investigated by an engineering firm experienced in that line of work.

If rehabilitation is necessary (and I suspect that will be the case) engineering design, etc. must be approved by D.E.C. before work can start. The whole process can be quite detailed and time consuming.

Very truly yours,

Fred Austin, P.E.
Supt. of Public Works

FA:vt

SUPERVISOR CARL H. ROBLEE

HIGHWAY SUPT
Joseph Thomas
R.D. North Creek

SOLE ASSESSOR
Austin J. Smith
Chestertown

HISTORIAN
Mrs. Mark H. Fish
Chestertown

TOWN OF CHESTER
WARREN COUNTY
CHESTERTOWN, NEW YORK 12817
Tel. Chestertown 494-2711

September 19, 1978

Re: Permit No. 557-04- 1 - 1977

New York State
Environmental Department of Conservation
P.O. Box 220
Hudson Street
Warrensburg, New York 12285
Attn: Mr. William Muermann

Dear Mr. Muermann:

Enclosed please find a copy of a letter from Mr. Fred Austin, Supt. of Warren County Highway Department in regards to condition of Loon Lake Dam.

Since we were unable to work on this project in 1977 but the work is needed at this time. Would it be possible to renew this permit for the work this fall. We would like to start as soon as possible.

Thank you for any help.

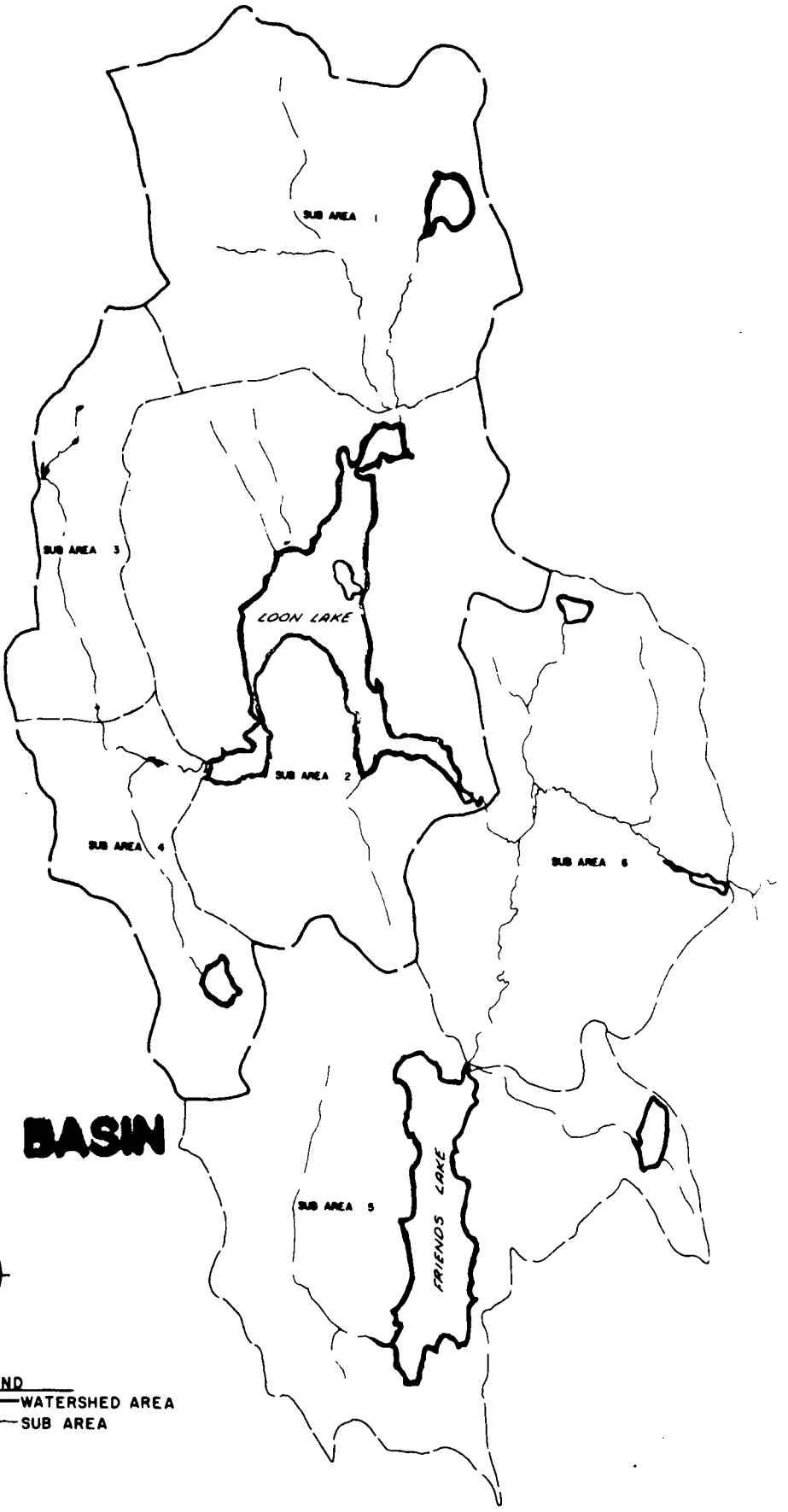
Sincerely,

Carl H. Roblee

Carl H. Roblee

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



DRAINAGE BASIN

LEGEND
——WATERSHED AREA
– – –SUB AREA

STETSON • DALE BANKERS TRUST BUILDING UTICA • NEW YORK • 13501
TEL 315-797-5800

DESIGN BRIEF

PROJECT NAME New York State Dam Inspections DATE

SUBJECT Leon Lake Dam PROJECT NO.

Estimate of Snyder's Parameters DRAWN BY

$C_p = 0.625$, All Sub-areas
$C_t = 2.0$, All Sub-areas

Sub-Area	Area (mi^2)	L_{CA} (mi)	L (mi)	t_p (hr)
1	3.81	1.33	2.65	2.92
2	5.35	0.47	1.23	1.70
3	1.54	1.14	2.33	2.68
4	1.62	1.14	2.46	2.73
5	5.46	1.14	2.8	2.83
6	4.13	1.0	3.03	2.79
	21.91			

Total Area Upstream of Dam = 12.32

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DESIGN BRIEF

PROJECT NAME New York State Dam Inspections DATE

SUBJECT Loon Lake Dam PROJECT NO

Depth-Area Duration DRAWN BY

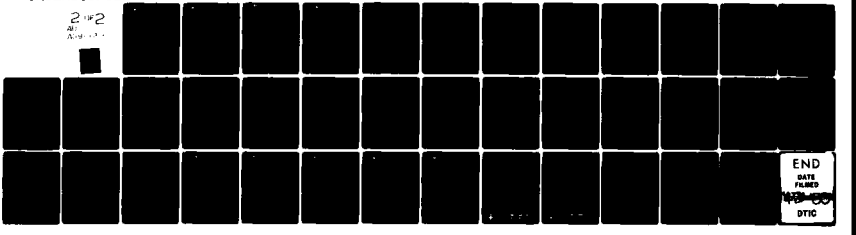
Drainage Basin Approx. Long., Lat. = 73°51', 43°41'

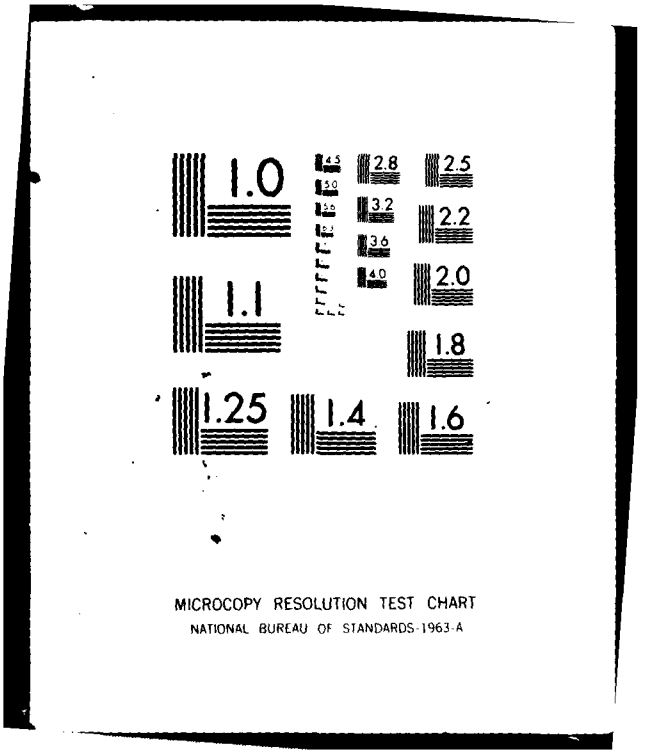
PMF

Index Rainfall = 17.4" - 200 mi², 24 hr.

Duration	% Index	Depth
6 hr.	109	18.97"
12 hr.	121	21.05
24 hr.	131	22.79
48 hr.	140	24.36

AD-A091 139 NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. LOON LAKE DAM (INVENTORY NUMBER NY--ETC(U)
JUL 80 J B STETSON DACW51-79-C-0001
UNCLASSIFIED NL




1.0
1.1
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1.4
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3.2
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4.0
4.5
5.0
5.6
6.3
7.1
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

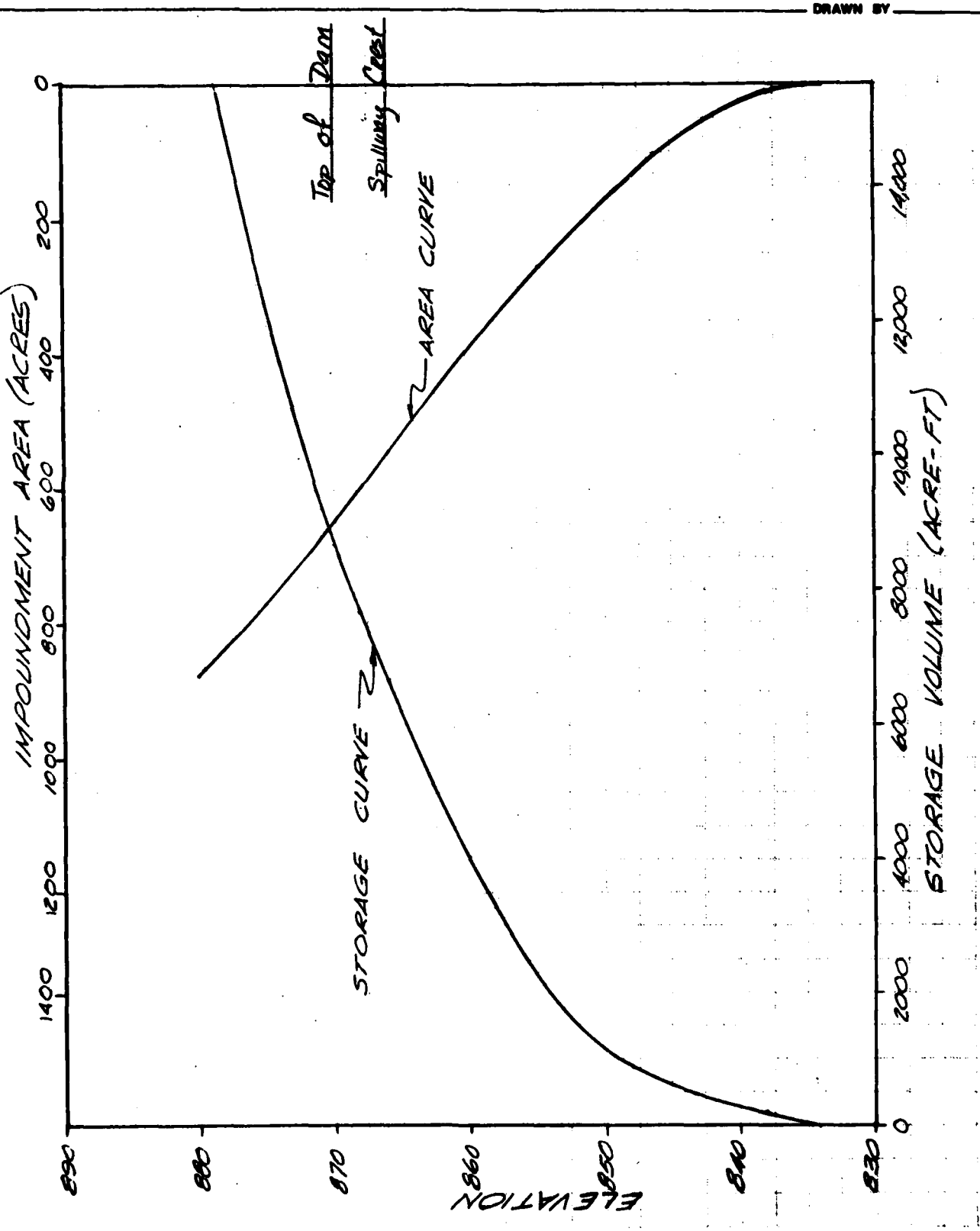
STETSON • DALE BANKERS TRUST BUILDING UTICA • NEW YORK • 13501
TEL 315-797-5800

DESIGN BRIEF

PROJECT NAME N.Y.S. DAM INSPECTION DATE

SUBJECT LOON LAKE DAM PROJECT NO. 2399

DRAWN BY



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DESIGN BRIEF

PROJECT NAME New York State Dam Inspections DATE

SUBJECT PROJECT NO.

Loon Lake DRAWN BY

Spillway Capacity

L = 32.67'
Crest @ 866
Top of Dam @ Elev. 870

Condition	C	Q = CLH^3/2 (H to top of Dam)
No Flashboards	3.2	836 cfs
6" Flashboards	3.32	710
12" "	3.32	565
18" "	3.32	430
24" "	3.32	305

Presently provisions for a maximum of 24" of flashboards

Sluice Gated Outlet Capacity (Low Level Outlet)

2.5' high x 2' wide, invert elev. ~ 857.5
L ~ 28' @ shallow slope according to plans say 1%
n ~ 0.13 K_e = 0.5 (Assumed sq. edged), K' = .02 Per bend

Inlet & Outlet control are compared to see which governs

Inlet Control: From Fig. B-12 "Design of Small Dams"

Outlet Control: $Q = A\sqrt{2g}\left[\frac{H + L\sin\theta - D/2}{1 + K_e + K' + \frac{29 n^2 L}{r^{4/3}}}\right]^{1/2} = 40.125\left[\frac{H - .97'}{2.0015}\right]^{1/2}$

Eqn. B7 Design of Small Dams

r = hydraulic radius @ full flow
θ = angle of slope = 0.573° ∴ $L\sin\theta$ = 1% x L = .28.
$r = \frac{A}{P} = \frac{2.5' \times 2'}{2(2.5'+2')} = 5/9$

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DESIGN BRIEF

PROJECT NAME New York State Dam Inspections DATE

SUBJECT Loon Lake PROJECT NO.

DRAWN BY

Low Level Outlet Capacity

Elev.	H	H/D	Q_I	Q_o	Q
870	12.5	5	80 cfs	96 cfs	80 cfs
866	8.5	3.4	63	78	63
864	6.5	2.6	53	67	53
862	4.5	1.8	39	53	39
860	2.5	1.0	10		10
859	1.5	0.6	5.5		5.5

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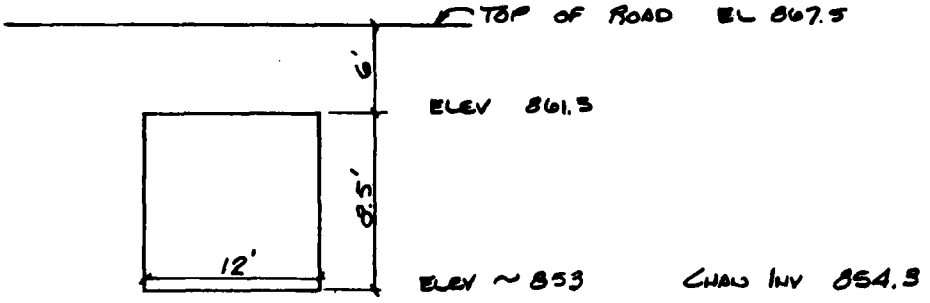
DESIGN BRIEF

PROJECT NAME NEW YORK STATE DAM INSPECTION DATE 5-27-80

SUBJECT LOON LAKE PROJECT NO. 2999

BOX CULVERT D/S FROM DAM DRAWN BY



ELEV	QCHAN	QROAD	QTOTAL	STORAGE
854.3	0		0	
857.3	186		186	.1
860.8	528		528	.25
863.3	924		924	.45
866.3	1290		1290	.85
869.3	1572	187	1760	1.45
872.3	1800	3455	5255	2.25
875.3	2050	8750	10800	3.25

```
(0001)   A1       LOON LAKE DAM
(0002)   A2       HEC-1DB (SNYDERS)
(0003)   A3       PMF RUNOFF ANALYSIS
(0004)   B     90         1         0         0         0         0         0         0         4
(0005)   B1     5
(0006)   J       1         6         1
(0007)   J1     .2        .4        .5        .6        .8       1.0
(0008)   K       0         1         0         0         0         0         1
(0009)   K1        SUB AREA 1 RUNOFF
(0010)   M       1         1      3.81         0     12.32         0         0         0         1
(0011)   P       0      17.4       109       121       131       140
(0012)   T       0         0         0         0         0         0         1       0.1         0       .03
(0013)   W   2.917      .625
(0014)   X      -2        -.1       1.6
(0015)   K       0         3         0         0         0         0         1
(0016)   K1        SUB AREA 3 RUNOFF
(0017)   M       1         1      1.54         0     12.32         0         0         0         1
(0018)   P       0      17.4       109       121       131       140
(0019)   T       0         0         0         0         0         0         1       0.1         0       .04
(0020)   W    2.68      .625
(0021)   X      -2        -.1       1.6
(0022)   K       1        40         0         0         0         0         1
(0023)   K1        CHANNEL ROUTE THRU AREA 4 TO LOON LAKE
(0024)   Y       0         0         0         1         1
(0025)   Y1      1         0         0         0         0         0        -1
(0026)   Y6    .06      .045       .06       868       900      4600      .006
(0027)   Y7    100       900       300       871       320       871       326       868       336       868
(0028)   Y7    342       871       362       871       600       900
(0029)   K       0        40         0         0         0         0         1
(0030)   K1        RUNOFF SUB AREA 4
(0031)   M       1         1      1.62         0     12.32         0         0         0         1
(0032)   P       0      17.4       109       121       131       140
(0033)   T       0         0         0         0         0         0         1       0.1         0       .04
(0034)   W    2.73      .625
(0035)   X      -2        -.1       1.6
(0036)   K       0         2         0         0         0         0         1
(0037)   K1        SUB AREA 2 RUNOFF
(0038)   M       1         1      5.35         0     12.32         0         0         0         1
```

```
(0039)   P       0     17.4      109      121      131      140
(0040)   T       0        0        0        0        0        0        1      0.1        0      .18
(0041)   W    1.70     .625
(0042)   X      -2     -.1      1.6
(0043)   K       4       20        0        0        0        0        1
(0044)   K1        COMBINE 4 HYDROGRAPHS AT LOON LAKE DAM
(0045)   K       1       20        0        0        0        0        1
(0046)   K1        ROUTE OVER LOON LAKE DAM
(0047)   Y       0        0        0        1        1
(0048)   Y1      1        0        0        0        0        0     -866
(0049)   $S      0       24      990     3290     6580     7670     8965    16500
(0050)   $E    834      838      848      858      866      868      870      880
(0051)   $$    866    32.67      3.2      1.5
(0052)   $D    870     2.64      1.5       65
(0053)   K       1    60.05        0        0        0        0        1
(0054)   K1        ROUTE THRU BOX CULVERT AT ROUTES 889
(0055)   Y       0        0        0        1        1
(0056)   Y1      1        0        0        0        0        0       -1
(0057)   Y2      0      0.1     0.25     0.45     0.85     1.45     2.25     3.25
(0058)   Y3      0      186      528      924     1290     1760     5255    10800
(0059)   Y4  854.3    857.3    860.3    863.3    866.3    869.3    872.3    875.3
(0060)   Y5      0      186      528      924     1290     1760     5255    10800
(0061)   K       1     60.1        0        0        0        0        1
(0062)   K1        CHANNEL ROUTE INTO SUB AREA 6
(0063)   Y       0        0        0        1        1
(0064)   Y1      1        0        0        0        0        0       -1
(0065)   Y6    .07     .045      .07      838      860     2100     .014
(0066)   Y7    100      860      700      840      850      838      852      836      862      836
(0067)   Y7    864      838     1000      840     1900      860
(0068)   K       0        5        0        0        0        0        1
(0069)   K1        SUB AREA 5 RUNOFF
(0070)   M       1        1     5.46        0    21.91        0        0        0        1
(0071)   P       0     17.4      109      121      131      140
(0072)   T       0        0        0        0        0        0        1      0.1        0      .16
(0073)   W    2.83     .625
(0074)   X      -2     -.1      1.6
(0075)   K       1     60.5        0        0        0        0        1
(0076)   K1        CHANNEL ROUTE INTO SUB AREA 6
```

```
(0077)   Y       0       0       0       1       1
(0078)   Y       1       0       0       0       0       0      -1
(0079)   Y6    .07    .045     .07     838     860    8700    .01
(0080)   Y7   100     860     950     840    1100     838    1102     836    1112     836
(0081)   Y7  1114     838    1414     840    1614     860
(0082)   K       2    40.1       0       0       0       0       1
(0083)   K1        COMBINE 2 HYDROGRAPHS AT 6C.1
(0084)   K       1    60.4       0       0       0       0       1
(0085)   K1        CHANNEL ROUTE THRU SUB AREA 6
(0086)   Y       0       0       0       1       1
(0087)   Y1      1       0       0       0       0       0      -1
(0088)   Y6    .07    .045     .07     834     860    1900    .001
(0089)   Y7   350     860     800     840     998     836    1000     834    1014     834
(0090)   Y7  1016     836    1130     840    1180     860
(0091)   K       1    60.3       0       0       0       0       1
(0092)   K1        CHANNEL ROUTE THRU SUB AREA 6
(0093)   Y       0       0       0       1       1
(0094)   Y1      1       0       0       0       0       0      -1
(0095)   Y6    .07    .045     .07     830     860    3700    .001
(0096)   Y7   100     860     700     840    1300     832    1302     830    1316     830
(0097)   Y7  1318     832    1410     840    1540     860
(0098)   K       1    60.2       0       0       0       0       1
(0099)   K1        CHANNEL ROUTE THRU SUB AREA 6
(0100)   Y       0       0       0       1       1
(0101)   Y1      1       0       0       0       0       0      -1
(0102)   Y6    .07    .045     .07     829     860    2100    .001
(0103)   Y7   100     860     370     840     500     831     502     829     516     829
(0104)   Y7   518     831     920     840    1080     860
(0105)   K       0       6       0       0       0       0       1
(0106)   K1        SUB AREA 6 RUNOFF
(0107)   M       1       1    4.13       0   21.91       0       0       0       1
(0108)   P       0    17.4     109     121     131     140
(0109)   T       0       0       0       0       0       0       1     0.1       0     .03
(0110)   W   2.789    .625
(0111)   X      -2    -.1     1.6
(0112)   K       2      60       0       0       0       0       1
(0113)   K1        COMBINE 2 HYDROGRAPHS AT 6C
(0114)   K       1      60       0       0       0       0       1
```

```
(0115)   K1       ROUTE THRU OUTLET 60 FAXONS POND
(0116)   Y      0       0       0       1       1
(0117)   Y1     1       0       0       0       0       0     -829
(0118)   $S     0      10      34      73
(0119)   $E   829     830     832     835
(0120)   $$   829      20     3.2     1.5
(0121)   $D   829     2.6     1.5     100
(0122)   K     99
(0123)   A
(0124)   A
(0125)   A
(0126)   A
(0127)   A
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
RUNOFF HYDROGRAPH AT	3
ROUTE HYDROGRAPH TO	40
RUNOFF HYDROGRAPH AT	40
RUNOFF HYDROGRAPH AT	2
COMBINE 4 HYDROGRAPHS AT	20
ROUTE HYDROGRAPH TO	20
ROUTE HYDROGRAPH TO	60.05
ROUTE HYDROGRAPH TO	60.1
RUNOFF HYDROGRAPH AT	5
ROUTE HYDROGRAPH TO	60.5
COMBINE 2 HYDROGRAPHS AT	40.1
ROUTE HYDROGRAPH TO	60.4
ROUTE HYDROGRAPH TO	60.3
ROUTE HYDROGRAPH TO	60.2
RUNOFF HYDROGRAPH AT	6
COMBINE 2 HYDROGRAPHS AT	60
ROUTE HYDROGRAPH TO	60
END OF NETWORK	

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE?THU, MAY 29 1980
     TIME?16:49:09

                         LOON LAKE DAM
                         HEC-1DB (SNYDERS)
                         PMF RUNOFF ANALYSIS

                                  JOB SPECIFICATION
          NQ      NHR     NMIN     IDAY     IHR     IMIN    METRC     IPLT     IPRT    NSTAN
          90        1        0        0       0        0        0        0        4        0
                                   JOPER      NWT   LROPT   TRACE
                                       5        0       0       0

                              MULTI-PLAN ANALYSES TO BE PERFORMED
                                        NPLAN= 1 NRTIO= 6 LRTIO= 1
                    RTIOS=    0.20    0.40    0.50    0.60    0.80    1.00


**********          **********          **********          **********          **********

                              SUB-AREA RUNOFF COMPUTATION

                  SUB AREA 1 RUNOFF
                           ISTAQ   ICOPP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                               1       0       0       0       0       0       1       0       0

                                        HYDROGRAPH DATA
                IHYDG     IUHG    TAREA     SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                    1        1     3.81     0.00   12.32    0.00  0.000C       0       1       0

                                        PRECIP DATA
                           SPFE      PMS       R6      R12      R24      R48      R72      R96
                           0.00    17.40   109.00   121.00   131.00   140.00     0.00     0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.807

                                        LOSS DATA
             LROPT    STRKR    DLTKR    RTIOL    ERAIN    STRKS    RTIOK    STRTL    CNSTL    ALSMX    RTIMP
                 0    0.00C    0.00C     1.0C     C.00     0.00     1.00     1.00     0.10     0.00     0.C3

                                   UNIT HYDROGRAPH DATA
                                TF=  2.92    CP=C.63    NTA=  0
```

RECESSION DATA
STRTQ= -2.CO QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 15 END-OF-PERIOD ORDINATES, LAG= 2.91 HOURS, CP= 0.62 VOL= 1.CC

89.	308.	5C1.	507.	371.	240.	155.	101.	65.	42.
27.	18.	11.	7.	5.					

C

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	19.66	16.19	3.47	49309.
										(499.)	(411.)	(88.)	(1396.27)

********** ********** ********* ********** **********

SUB-AREA RUNOFF COMPUTATION

SUB AREA 3 RUNOFF

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.54	0.00	12.32	0.00	C.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	17.40	1C9.00	121.00	131.00	140.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.807

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.04

UNIT HYDROGRAPH DATA
TP= 2.68 CP=0.63 NTA= C

RECESSION DATA
STRTQ= -2.CC QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 15 END-OF-PERIOD ORDINATES, LAG= 2.66 HOURS, CP= 0.63 VOL= 1.CC

46.	153.	224.	194.	128.	85.	56.	37.	24.	16.
11.	7.	5.	3.	2.					

C

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	19.66	16.23	3.44	20061.
										(499.)	(412.)	(87.)	(568.06)

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTE THRU AREA 4 TO LOON LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
40	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPRP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	0.0450	0.0600	868.0	900.0	4600.	0.00600

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 900.00 300.00 871.00 320.00 871.00 326.00 868.00 336.00 868.00
342.00 871.00 362.00 871.00 600.00 900.00

STORAGE	0.00	2.38	7.59	21.87	40.67	64.00	91.85	124.22	161.12
	248.49	298.97	353.96	413.48	477.53	546.09	619.19	696.80	778.94
OUTFLOW	0.00	68.23	272.58	899.48	1982.57	3566.07	5704.30	8451.71	11861.46
	20872.75	26572.98	33133.08	40599.16	49016.30	58428.47	68878.75	80409.39	93061.84
STAGE	868.00	869.68	871.37	873.05	874.74	876.42	878.11	879.79	881.47
	884.84	886.53	888.21	889.89	891.58	893.26	894.95	896.63	898.32
FLOW	0.00	68.23	272.58	899.48	1982.57	3566.07	5704.30	8451.71	11861.46
	20872.75	26572.98	33133.08	40599.16	49016.30	58428.47	68878.75	80409.39	93061.84

MAXIMUM STAGE IS 871.9

MAXIMUM STAGE IS 873.2

MAXIMUM STAGE IS 873.5

MAXIMUM STAGE IS 873.9

MAXIMUM STAGE IS 874.7

MAXIMUM STAGE IS 875.2

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

RUNOFF SUB AREA 4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
40	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.62	0.00	12.32	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	17.40	109.00	121.00	131.00	140.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.807

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.04

UNIT HYDROGRAPH DATA

TF= 2.73 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 15 END-OF-PERIOD ORDINATES, LAG= 2.71 HOURS, CP= 0.63 VOL= 1.00

46.	154.	231.	205.	137.	91.	61.	40.	27.	18.
12.	8.	5.	3.	2.					

END-OF-PERIOD FLOW

0 MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	19.66	16.23	3.44	21037.
										(499.)	(412.)	(87.)	(595.70)

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

SUB AREA 2 RUNOFF

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	5.35	0.00	12.32	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	17.40	109.00	121.00	131.00	140.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.807

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.18

UNIT HYDROGRAPH DATA

TP= 1.70 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 9 END-OF-PERIOD ORDINATES, LAG= 1.69 HOURS, CP= 0.62 VOL= 1.00

492. 1154. 969. 449. 208. 96. 45. 21. 10.

0

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	19.66	16.73	2.94	76196.
										(499.)	(425.)	(75.)	(2157.63)

********** ********** ********** ********** **********

COMBINE HYDROGRAPHS

COMBINE 4 HYDROGRAPHS AT LOON LAKE DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
20	4	0	0	0	0	1	0	0

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE OVER LOON LAKE DAM

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
20	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-866.	0

CAPACITY=	0.	24.	990.	3290.	6580.	7670.	8965.	16500.
ELEVATION=	837.	838.	848.	858.	866.	868.	870.	880.

ELEVATION- 834. 838. 846. 858. 866. 868. 870. 880.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
866.0	32.7	3.2	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
870.0	2.6	1.5	65.

PEAK OUTFLOW IS 570. AT TIME 48.00 HOURS

PEAK OUTFLOW IS 1575. AT TIME 47.00 HOURS

PEAK OUTFLOW IS 2277. AT TIME 47.00 HOURS

PEAK OUTFLOW IS 3062. AT TIME 46.00 HOURS

PEAK OUTFLOW IS 4793. AT TIME 46.00 HOURS

PEAK OUTFLOW IS 6661. AT TIME 46.00 HOURS

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HYDROGRAPH ROUTING

ROUTE THRU BOX CULVERT AT ROUTES 889

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
60.05	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

STORAGE	0.00	0.10	0.25	0.45	0.85	1.45	2.25	3.25
OUTFLOW	0.00	186.00	528.00	924.00	1290.00	1760.00	5255.00	10800.00
STAGE	854.30	857.30	860.30	863.30	866.30	869.30	872.30	875.30
FLOW	0.00	186.00	528.00	924.00	1290.00	1760.00	5255.00	10800.00

MAXIMUM STAGE IS 860.6

MAXIMUM STAGE IS 868.1

MAXIMUM STAGE IS 869.7

MAXIMUM STAGE IS 870.4

MAXIMUM STAGE IS 871.9

MAXIMUM STAGE IS 873.1

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HYDROGRAPH ROUTING

CHANNEL ROUTE INTO SUB AREA 6

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
60.1	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0450	0.0700	838.0	860.0	2100.	0.01400

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 860.00 700.00 840.00 850.00 838.00 852.00 836.00 862.00 836.00
864.00 838.00 1000.00 840.00 1900.00 860.00

STORAGE	0.00	6.56	21.04	41.53	66.87	97.05	132.09	171.97	216.69
	320.69	379.95	444.07	513.03	586.84	665.50	749.00	837.35	930.55
OUTFLOW	0.00	463.10	1616.66	3937.08	7433.43	12231.63	18461.50	26251.01	35724.83
	60206.83	75447.41	92837.69	112486.72	134501.03	158985.13	186041.09	215769.25	248268.13
STAGE	838.00	839.16	840.32	841.47	842.63	843.79	844.95	846.10	847.26
	849.58	850.74	851.89	853.05	854.21	855.37	856.53	857.68	858.84
FLOW	0.00	463.10	1616.66	3937.08	7433.43	12231.63	18461.50	26251.01	35724.83
	60206.83	75447.41	92837.69	112486.72	134501.03	158985.13	186041.09	215769.25	248268.13

MAXIMUM STAGE IS 839.3

MAXIMUM STAGE IS 840.3

MAXIMUM STAGE IS 840.6

MAXIMUM STAGE IS 841.0

MAXIMUM STAGE IS 871.9

MAXIMUM STAGE IS 841.8

MAXIMUM STAGE IS 842.4

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SUB-AREA RUNOFF COMPUTATION

SUB AREA 5 RUNOFF

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIC	ISNOW	ISAME	LOCAL
1	1	5.46	0.00	21.91	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PRS	R6	R12	R24	R48	R72	R96
0.00	17.40	109.00	121.00	131.00	140.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.826

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.16

UNIT HYDROGRAPH DATA

TP= 2.83 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 15 END-OF-PERIOD ORDINATES, LAG= 2.81 HOURS, CP= 0.62 VOL= 1.00

138.	473.	744.	707.	495.	327.	216.	143.	94.	62.
41.	27.	18.	12.	8.					

0

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	20.12	17.09	3.03	73981.
										(511.)	(434.)	(77.)	(2094.91)

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HYDROGRAPH ROUTING

CHANNEL ROUTE INTO SUB AREA 6

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6C.5	1	0	0	0	0	1	0	0

ROUTING DATA

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
C.C	0.CCO	C.CC	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.CCO	0.000	C.CCO	-1.	C

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
C.C700	0.0450	0.07CC	838.C	860.C	8700.	0.0100C

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 860.00 950.0C 840.0C 11CC.0C 838.00 1102.0C 836.00 1112.00 836.00
1114.00 838.00 1414.0C 840.0C 1614.0C 860.00

STORAGE	0.00	38.15	130.04	248.20	38C.42	526.69	687.C2	861.41	1049.85
	1468.91	1699.52	1944.19	2202.92	2475.71	2762.55	3063.44	3378.40	3707.41
OUTFLOw	0.00	472.66	1927.8C	4926.48	9205.54	14759.27	21612.74	29804.29	39378.97
	62874.52	76897.9e	92508.3e	109758.31	128700.55	149387.50	171871.5e	196204.50	222438.C6
STAGE	838.00	839.16	840.32	841.47	842.63	843.79	844.95	846.10	847.26
	849.5e	850.74	851.89	853.05	854.21	855.37	856.53	857.68	858.84
FLOW	0.00	472.66	1927.8C	4926.48	9205.54	14759.27	21612.74	29804.29	39378.97
	62874.52	76897.98	92508.3e	109758.31	128700.55	149387.50	171871.5e	196204.50	222438.C6

MAXIMUM STAGE IS 840.1

MAXIMUM STAGE IS 840.9

MAXIMUM STAGE IS 841.2

MAXIMUM STAGE IS 841.6

MAXIMUM STAGE IS 842.0

MAXIMUM STAGE IS 842.5

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS AT 60.1

ISTAQ	ICCPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4C.1	2	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

CHANNEL ROUTE THRU SUB AREA 6

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
60.4	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0450	0.0700	834.0	860.0	1900.	0.00100

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

350.00 860.00 800.00 840.00 998.00 836.00 1000.00 834.00 1014.00 834.00
1016.00 836.00 1130.00 840.00 1180.00 860.00

STORAGE	0.00	0.92	2.90	10.59	24.65	44.26	66.23	90.25	116.31
	174.55	206.73	240.96	277.23	315.54	355.89	398.28	442.72	489.19
OUTFLOW	0.00	24.54	89.96	290.85	739.54	1580.35	2799.99	4352.19	6239.73
	11050.60	13993.21	17308.29	21007.20	25101.52	29602.98	34523.39	39874.54	45668.18
STAGE	834.00	835.37	836.74	838.11	839.47	840.84	842.21	843.58	844.95
	847.68	849.05	850.42	851.79	853.16	854.53	855.89	857.26	858.63
FLOW	0.00	24.54	89.96	290.85	739.54	1580.35	2799.99	4352.19	6239.73
	11050.60	13993.21	17308.29	21007.20	25101.52	29602.98	34523.39	39874.54	45668.18

MAXIMUM STAGE IS 841.4

MAXIMUM STAGE IS 843.6

MAXIMUM STAGE IS 844.6

MAXIMUM STAGE IS 845.6

MAXIMUM STAGE IS 847.3

MAXIMUM STAGE IS 848.9

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HYDROGRAPH ROUTING

CHANNEL ROUTE THRU SUB AREA 6

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6C.3	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
C.C	0.C00	0.C0	1	1	0	0	C

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.CC0	C.C00	C.CC0	-1.	C

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0450	0.0700	830.0	860.C	3700.	0.0010C

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 860.00 700.0C 840.0C 13C0.0C 832.00 1302.00 83C.00 1316.00 83C.00
1316.00 832.00 141C.0C 840.0C 154C.CC 860.00

STORAGE	0.00	2.09	9.41	34.41	77.73	139.36	219.31	315.22	419.45
	651.10	778.52	913.66	1056.54	1207.14	1365.47	1531.53	1705.31	1886.83
OUTFLOW	C.00	31.18	134.05	487.75	1266.20	2608.68	4638.C1	7687.17	11636.95
	21890.78	28222.37	35382.23	43392.00	52274.58	62053.63	72753.3C	84398.06	97012.48
STAGE	830.0C	831.58	833.16	834.74	836.32	837.89	839.47	841.05	842.63
	845.79	847.37	848.95	850.53	852.10	853.68	855.26	856.84	858.42
FLOW	0.00	31.18	134.05	487.75	1266.20	2608.68	4638.C1	7687.17	11636.95
	21890.78	28222.37	35382.23	43392.00	52274.58	62053.63	72753.3C	84398.06	97012.48

MAXIMUM STAGE IS 837.2

MAXIMUM STAGE IS 839.3

MAXIMUM STAGE IS 840.0

MAXIMUM STAGE IS 840.8

MAXIMUM STAGE IS 842.1

MAXIMUM STAGE IS 843.3

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HYDROGRAPH ROUTING

CHANNEL ROUTE THRU SUB AREA 6

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6C.2	1	0	0	0	1	0	0	

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPPP	LSTR
C.0	0.CCO	0.CO	1	1	0	0	C

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.CCO	0.CCO	C.COO	-1.	C

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELMVT	ELMAX	RLNTH	SEL
0.0700	0.0450	0.0700	829.C	860.C	2100.	0.CO1CC

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 860.00 37C.0C 84C.0C 5CC.CO 831.00 5C2.00 829.0C 516.00 829.00
518.00 831.CO 92C.0C 84C.0C 10ECC.CC 860.00

STORAGE	0.00	1.23	4.91	15.99	34.66	60.91	94.74	136.00	181.35
	28C.32	333.95	39C.33	449.48	511.38	576.04	643.46	713.64	786.57
OUTFLOW	0.00	32.94	136.77	445.20	1084.33	2156.44	3752.1C	6C40.17	9216.9C
	17447.05	22499.45	28183.38	34506.95	41479.95	49113.30	57418.71	66408.53	76095.63
STAGE	829.00	830.63	832.26	833.89	835.53	837.16	838.79	840.42	842.05
	845.31	846.95	848.58	850.21	851.84	853.47	855.1C	856.73	858.37
FLOW	C.OC	32.94	136.77	445.20	1084.33	2156.44	3752.1C	6C40.17	9216.9C
	17447.05	22499.45	28183.38	34506.95	41479.95	49113.30	57418.71	66408.53	76095.63

MAXIMUM STAGE IS 836.9

MAXIMUM STAGE IS 839.2

MAXIMUM STAGE IS 840.2

MAXIMUM STAGE IS 841.C

MAXIMUM STAGE IS 842.5

MAXIMUM STAGE IS 843.9

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SUB-AREA RUNOFF COMPUTATION

SUB AREA 6 RUNOFF

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	4.13	0.00	21.91	0.0C	0.00C	C	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
C.0C	17.4C	1C9.0C	121.00	131.00	140.0C	C.00	C.00

TRSPC COMPUTED BY THE PROGRAM IS 0.826

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
C	0.00	0.0C	1.0C	C.00	C.0C	1.00	1.0C	0.1C	C.CC	C.C3

UNIT HYDROGRAPH DATA

TP= 2.79 CP=0.63 NTA= 0

RECESSION DATA

STRTQ= -2.CC QRCSN= -0.1C RTIOR= 1.60

UNIT HYDROGRAPH 15 END-OF-PERIOD ORDINATES, LAG= 2.77 HOURS, CP= C.62 VOL= 1.CC

109.	370.	571.	527.	363.	242.	161.	107.	71.	48.
32.	21.	14.	9.	6.					

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	20.12	16.62	3.50	54703.
										(511.)	(422.)	(89.)	(1549.01)

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS AT 60

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
60	2	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

ROUTE THRU OUTLET 6C FAXONS POND

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

		60	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

	NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
	1	0	0	0.000	0.000	0.000	-829.	0

CAPACITY=	0.	10.	34.	73.
ELEVATION=	829.	830.	832.	835.

CREL	SPWID	COGW	EXPW	ELEVL	COGL	CAREA	EXPL
829.0	20.0	3.2	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COGD	EXPD	DAMWID
829.0	2.6	1.5	100.

PEAK OUTFLOW IS 2997. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 6459. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 8313. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 11356. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 14603. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 19007. AT TIME 44.00 HOURS

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 0.20	RATIO 2 0.40	RATIO 3 0.50	RATIO 4 0.60	RATIO 5 0.80	RATIO 6 1.00
HYDROGRAPH AT	1	3.81	1	1185.	2371.	2964.	3556.	4742.	5927.
	(	9.87)	(	33.57)(	67.14)(	83.92)(	100.71)(	134.28)(	167.85)(
HYDROGRAPH AT	3	1.54	1	494.	987.	1234.	1481.	1975.	2468.
	(	3.99)	(	13.98)(	27.96)(	34.95)(	41.94)(	55.91)(	69.89)(
ROUTED TO	40	1.54	1	483.	967.	1209.	1444.	1929.	2417.
	(	3.99)	(	13.69)(	27.38)(	34.23)(	40.89)(	54.62)(	68.46)(
HYDROGRAPH AT	40	1.62	1	512.	1024.	1280.	1536.	2048.	2560.
	(	4.20)	(	14.50)(	29.00)(	36.25)(	43.50)(	57.99)(	72.49)(
HYDROGRAPH AT	2	5.35	1	2180.	4360.	5450.	6540.	8720.	10900.
	(	13.86)	(	61.73)(	123.47)(	154.33)(	185.20)(	246.93)(	308.67)(
4 COMBINED	20	12.32	1	4198.	8399.	10518.	12615.	16810.	21036.
	(	31.91)	(	118.86)(	237.84)(	297.84)(	357.22)(	476.02)(	595.67)(
ROUTED TO	20	12.32	1	570.	1575.	2277.	3062.	4793.	6661.
	(	31.91)	(	16.13)(	44.59)(	64.48)(	86.70)(	135.73)(	188.61)(
ROUTED TO	60.05	12.32	1	570.	1576.	2276.	3067.	4782.	6673.
	(	31.91)	(	16.13)(	44.63)(	64.45)(	86.85)(	135.42)(	188.95)(
ROUTED TO	60.1	12.32	1	569.	1574.	2280.	3065.	4782.	6679.
	(	31.91)	(	16.12)(	44.58)(	64.58)(	86.80)(	135.42)(	189.14)(
HYDROGRAPH AT	5	5.46	1	1738.	3475.	4344.	5213.	6950.	8688.
	(	14.14)	(	49.20)(	98.41)(	123.01)(	147.61)(	196.81)(	246.02)(
ROUTED TO	60.5	5.46	1	1672.	3468.	4335.	5234.	6989.	8732.
	(	14.14)	(	47.35)(	98.20)(	122.75)(	148.22)(	197.90)(	247.25)(
2 COMBINED	40.1	17.78	1	2041.	4388.	5748.	7223.	10309.	13701.
	(	46.05)	(	57.80)(	124.27)(	162.78)(	204.55)(	291.91)(	387.97)(
ROUTED TO	60.4	17.78	1	2058.	4375.	5779.	7293.	10383.	13740.
	(	46.05)	(	58.27)(	123.88)(	163.64)(	206.52)(	294.00)(	389.08)(

ROUTED TO	60.3	17.78	1	2009.	4366.	5750.	7209.	10399.	13770.
		(46.05)		(56.89)(	123.65)(	162.82)(	204.13)(	294.48)(	389.92)(
ROUTED TO	60.2	17.78	1	1999.	4344.	5672.	7194.	10358.	13719.
		(46.05)		(56.61)(	123.01)(	160.62)(	203.70)(	293.30)(	388.46)(
HYDROGRAPH AT	6	4.13	1	1314.	2628.	3285.	3942.	5256.	6570.
		(10.70)		(37.21)(	74.42)(	93.02)(	111.63)(	148.84)(	186.05)(
2 COMBINED	60	21.91	1	2990.	6427.	8276.	10318.	14523.	18926.
		(56.75)		(84.67)(	181.99)(	234.34)(	292.17)(	411.25)(	535.93)(
ROUTED TO	60	21.91	1	2997.	6459.	8313.	10356.	14603.	19007.
		(56.75)		(84.86)(	182.89)(	235.39)(	293.24)(	413.50)(	538.23)(

PLAN 1 STATION 40

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	483.	871.9	43.00
0.40	967.	873.2	43.00
0.50	1209.	873.5	42.00
0.60	1444.	873.9	42.00
0.80	1929.	874.7	43.00
1.00	2417.	875.2	42.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	866.00	866.00	870.00
STORAGE	6580.	6580.	8965.
OUTFLOW	0.	0.	836.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	869.10	0.00	8380.	570.	0.00	48.00	0.00
0.40	871.37	1.37	9996.	1575.	26.00	47.00	0.00
0.50	872.33	2.33	10722.	2277.	34.00	47.00	0.00
0.60	873.27	3.27	11427.	3062.	38.00	46.00	0.00
0.80	875.05	5.05	12770.	4793.	46.00	46.00	0.00
1.00	876.72	6.72	14030.	6661.	50.00	46.00	0.00

PLAN 1 STATION 60.05

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	570.	860.6	48.00
0.40	1576.	868.1	47.00
0.50	2276.	869.7	47.00
0.60	3067.	870.4	46.00
0.80	4782.	871.9	46.00
1.00	6673.	873.1	46.00

PLAN 1 STATION 60.1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	569.	839.3	48.00
0.40	1574.	840.3	47.00
0.50	2280.	840.6	47.00
0.60	3065.	841.0	46.00
0.80	4782.	841.8	46.00
1.00	6679.	842.4	46.00

PLAN 1 STATION 60.5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	1672.	840.1	43.00
0.40	3468.	840.9	43.00
0.50	4335.	841.2	43.00
0.60	5234.	841.6	43.00

0.80	8969.	842.0	43.00
1.00	8732.	842.5	43.00

PLAN 1 STATION 6C.4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	2058.	841.4	44.00
0.40	4375.	843.6	44.00
0.50	5779.	844.6	44.00
0.60	7293.	845.6	44.00
0.80	10383.	847.3	44.00
1.00	13740.	848.9	44.00

PLAN 1 STATION 6C.3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	2009.	837.2	44.00
0.40	4366.	839.3	44.00
0.50	5750.	840.0	44.00
0.60	7209.	840.8	44.00
0.80	10399.	842.1	44.00
1.00	13770.	843.3	44.00

PLAN 1 STATION 6C.2

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.20	1999.	836.9	45.00
0.40	4344.	839.2	44.00
0.50	5672.	840.2	44.00
0.60	7194.	841.0	44.00
0.80	10358.	842.5	44.00
1.00	13719.	843.9	44.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	829.00	829.00	829.00
STORAGE	0.	C.	0.
CUTFLOW	0.	C.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX CUTFLOW HOURS	TIME OF FAILURE HOURS
C.20	833.41	4.41	52.	2997.	90.00	44.00	0.00
0.40	836.35	7.35	91.	6459.	90.00	44.00	0.00
0.50	837.70	8.70	108.	8313.	90.00	44.00	0.00
0.60	839.07	10.07	126.	10356.	90.00	44.00	0.00
0.80	841.66	12.66	160.	14603.	90.00	44.00	0.00
1.00	844.10	15.10	191.	19007.	90.00	44.00	0.00

APPENDIX D

STABILITY ANALYSIS

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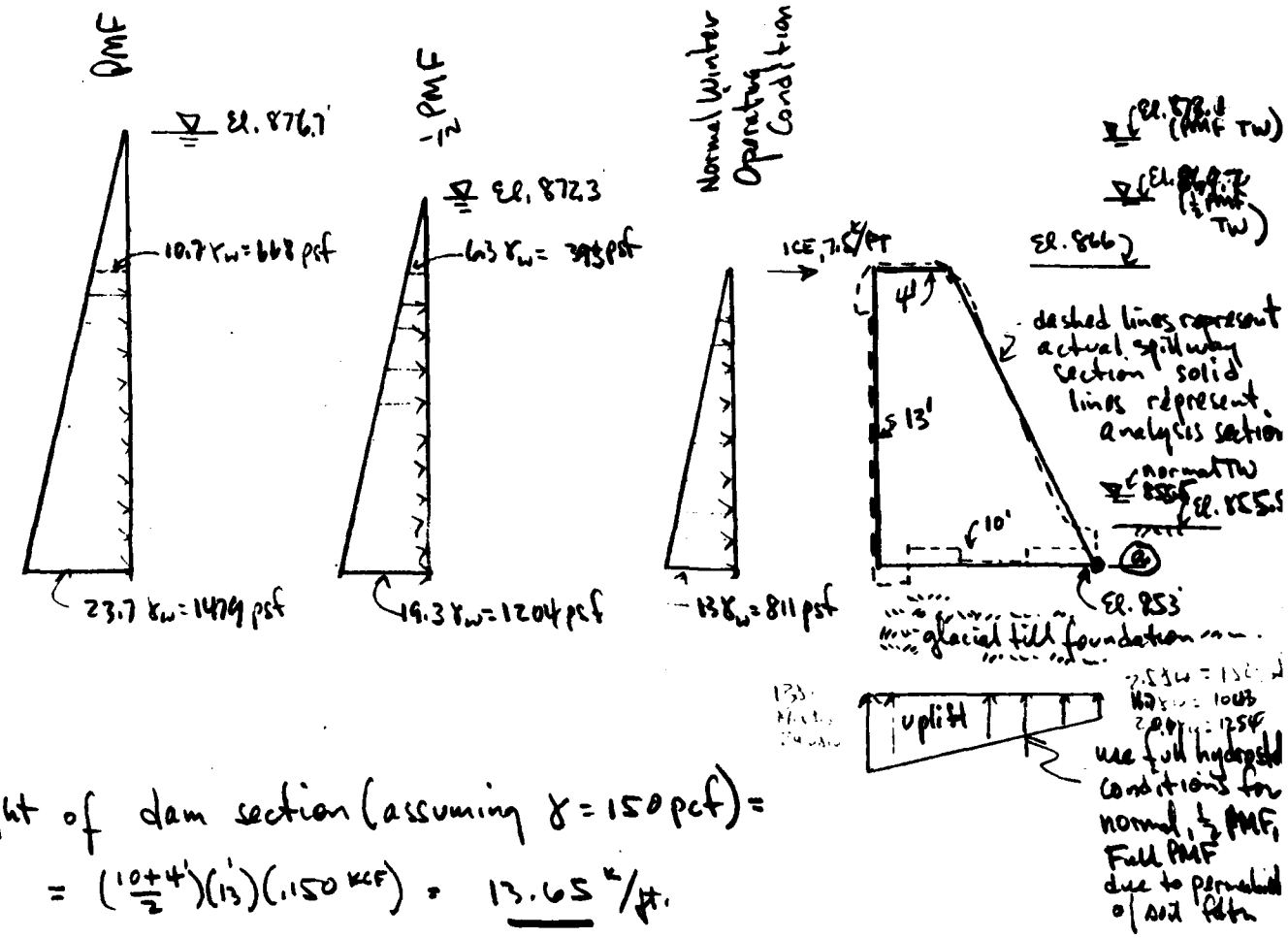
PROJECT NAME LOON LAKE DATE 5/22/80

SUBJECT STABILITY ANALYSIS PROJECT NO.

DRAWN BY DFM

Assumed Dam Section and Loading Conditions



Weight of dam section (assuming $\gamma = 150$ pcf) =

$= \left(\frac{10+4'}{2}\right)(13')(.150\ \text{KCF}) = \underline{13.65}\ ^{K}/_{ft.}$

M_a due to mass of dam $= (.15)\left[(4 \times 13' \times 8') + \left(\frac{1}{2} \times 6 \times 13 \times \frac{2}{3} \times 6\right)\right] = \underline{85.8}\ ^{1K}/_{ft.}$

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DESIGN BRIEF

2/5

PROJECT NAME L.L. DATE

SUBJECT PROJECT NO.

DRAWN BY

Case I. Normal Winter Operating Conditions (WL @ Spillway Elevation)

(a) Overturning

M_a causing overturning due to upst. H_2O pressure, ice, uplift, neglect k_a

$$= \left(\tfrac{1}{2} \times .811 \times 13 \times \tfrac{13}{3}\right) + (7.5^{k} \times 12') + \left[(.156 \times 10 \times \tfrac{10}{2}) + (.811 - .156)(\tfrac{10}{2})(\tfrac{20}{3})\right] =$$

$$= 22.8 + 90 + (7.8 + 21.8) = 143^{k} = 113^{k}$$

7.5^{k}/ft ice
5.0^{k}/ft ice

M_a resisting overturning due to mass of dam, dwnst. H_2O pressure, neglect k_p

$$= 85.8 + \left(.156 \times \tfrac{2.5}{2} \times \tfrac{2.5}{3}\right) = 86^{k}$$

FS against overturning $= \dfrac{86^{k}}{143^{k}} = \underline{0.60}$ (unsafe)

Position of Resultant, P, falls outside of base since FS < 1

FS against overturning without ice $= \dfrac{86}{(143-90)} = \underline{1.62}$ (ok)

FS against overturning without uplift $= \dfrac{86}{143-29.6} = 0.76$ (unsafe) -7.5^{k}/ice

d (without ice) $= \dfrac{(86-53)}{(13.65-4.84)} = 3.75'$ $\qquad 117.4 = 1.0$ - 5^{k}/ice -

(b) Sliding $\qquad \underline{d} = \frac{3.75}{10} = \underline{.386}$

$$FS = \frac{\mu N + \text{dnstream } H_2O \text{ pressure}}{\text{upst. } H_2O \text{ pressure} + \text{ice}}$$

$$= \frac{(0.6)\left[13.65 - (\tfrac{.811 + .156}{2})(10')\right] + (.156 \times \tfrac{2.5}{2})}{(.811 \times \tfrac{13}{2}) + 7.5^{k}} = \frac{5.3 + 0.2}{5.3 + 7.5} = \underline{0.43}$$

5.5 4.84 7.5^{k}/ice

$FS = \frac{5.5}{5.5} = \underline{1.04}$ no ice $\qquad FS = \underline{0.53}$ 12.8 5^{k}/ice

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PROJECT NAME L.L. DATE

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Case II. Water @ ½ PMF Levels

(c) Overturning

M_a causing overturning due to upst. H_2O pressure, uplift.

$$= \left[\left(.1393 \times \frac{13 \times 13}{2}\right)^{\text{H}_2\text{O}} + 22.8\right] + \left[\left(1.043 \times 10 \times \frac{10}{2}\right) + \left(1.204 - 1.043\right)\left(\frac{10}{2}\right)\left(\frac{20}{3}\right)\right] =$$

(33.2; 52.2; 5.4; uplift)

$$= (33.2 + 22.8) + (52.2 + 5.4) = 113.6^{\text{k}}$$

M_a resisting overturning due to mass of dam, downst H_2O pressure

$$= 85.8^{\text{k}} + \left[\left(.123 \times 13 \times \frac{13}{2}\right) + (22.8)\right] = 128.2^{\text{k}}$$

(19.5; 11.1)

FS against overturning $= \frac{128.2^{\text{k}}}{113.6^{\text{k}}} = \underline{1.13}$ no H_2O on downstream face

Position of Resultant, R: $d = \frac{\Sigma M_{toe}}{\Sigma V}$

where $V = W_{dam} - \text{uplift} = 136.5 - \left(\frac{1.204 + 1.043}{2}\right)(10)$ (11.2) neglect downward H_2O on inclined face of dam

$= 2.4^{\text{k}}$

$d = \frac{(128.2 - 113.6)^{\text{k}}}{(2.4)^{\text{k}}} = 6.1'$ from toe, $= \frac{6.1}{10}(6) = \underline{0.69}\,b$ [within middle third]

(f1) Sliding

$$FS = \frac{\mu N + \text{downstream } H_2O \text{ pressure} + \text{wt. } H_2O \text{ on downst. face})}{\text{upstream } H_2O \text{ pressure}}$$

$$= \frac{(0.6)\left[136.5 - \left(\frac{1.204 + 1.043}{2}\right)(10)\right] + \left(\frac{.123p + 1.043}{2}\right)(13)}{\frac{1}{2}(.993 + 1.204)(13)} = \frac{1.6^{\text{k}} + 8.3^{\text{k}} + 1.5^{\text{k}}}{10.1^{\text{k}}} = \underline{0.95}$$

(11.2; 1.6; 8.3; 1.5; 10.1)

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PROJECT NAME L.L. DATE

SUBJECT PROJECT NO.

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Case III · Water @ PMF Levels

(e) Overturning

M_a causing overturning due to upstream H_2O pressure, uplift

$$= \left[\left(.668 \times 13 \times \tfrac{13}{2}\right) + 22.8\right] + \left[\left(1.254 \times 10 \times \tfrac{10}{2}\right) + \left(1.479 - 1.254\right)\left(\tfrac{10}{2}\right)\left(\tfrac{20}{3}\right)\right]$$

$$= (56.5 + 22.8) + (62.7 + 7.5) = 149.5^{1K}$$

M_a resisting overturning due to mass of dam, downstream H_2O pressure

$$= 85.8^{1K} + \left[\left(.443 \times \tfrac{13}{2} \times 13\right) + \left(1.254 - .443\right)\left(\tfrac{13}{2}\right)\left(\tfrac{13}{3}\right)\right] = 146.1^{1K}$$

FS against overturning $= \dfrac{146.1^{1K}}{149.5^{1K}} = \underline{0.98}$ no H_2O on top of dam

Position of Resultant, R, outside of base since FS < 1

FS against overturning $= \dfrac{146.1 + \left[\left(\tfrac{13 \times 6}{2}\right)(2)(.0624) + \left(7.1 \times 10 \times .0624 \times \tfrac{10}{2}\right)\right]}{149.5^{1K}} = \dfrac{173}{160} = \underline{1.11}$ with H_2O on top of dam

(f) Sliding

$$FS = \frac{\mu N + \text{downstream } H_2O \text{ pressure}}{\text{upstream } H_2O \text{ pressure}}$$

$$= \frac{(0.6)\left[13.65 - \left(\tfrac{1.479 + 1.254}{2}\right)(10)\right] + \left(.443 + \tfrac{1.254}{2}\right)(13)}{\tfrac{1}{2}(.668 + 1.479)(13)} = \underline{\text{uplift of structure occurs}}$$

$$= \frac{(0.6)\left\{\left[13.65 + (2.43 + 4.43)\right] - 13.7\right\} + 11.4}{14.0} = \frac{4.1 + 11.4}{14.0} = \underline{1.11}$$ with H_2O above dam

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DESIGN BRIEF

PROJECT NAME L.L. DATE

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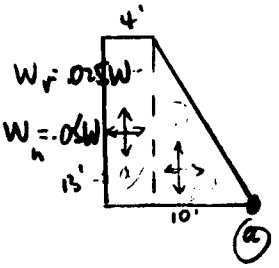
IV. Case IV. Normal Operating Condition (WL @ Spillway Elevation) plus Seismic

g) Overturning

Ref. Case I, M_a causing (exclude ice) = 53^{IK}
M_a resisting (excluding seismic) = 86^{IK}

(i) additional M_a due to seismic effects, applying coef. for force to W
use factor = .05 (W) for horizontal
= ½(.05 W) for vertical



M_a = $(4\times13\times.15\times8\times.025)_{1.52}$ + $(4\times13\times.15\times\frac{13}{2}\times.05)_{2.54}$ + $(\frac{1}{2}\times6\times13\times.15)_{.59}(4')(.025)$
+ $(\frac{1}{2}\times6\times13\times.15\times4\times.05)_{1.17}$ = 5.9^{IK}

(ii) additional M_a due to inertial effect on reservoir water

$M_a = 0.30\,P_w H^2 = (0.30)(.73\times.05\times.0624\times13')(13'\times13') = 1.5^{IK}$

FS against overturning = $\frac{86^{IK}}{(53+5.9+1.5)^{IK}} = \frac{86}{60.4} = \underline{1.43}$

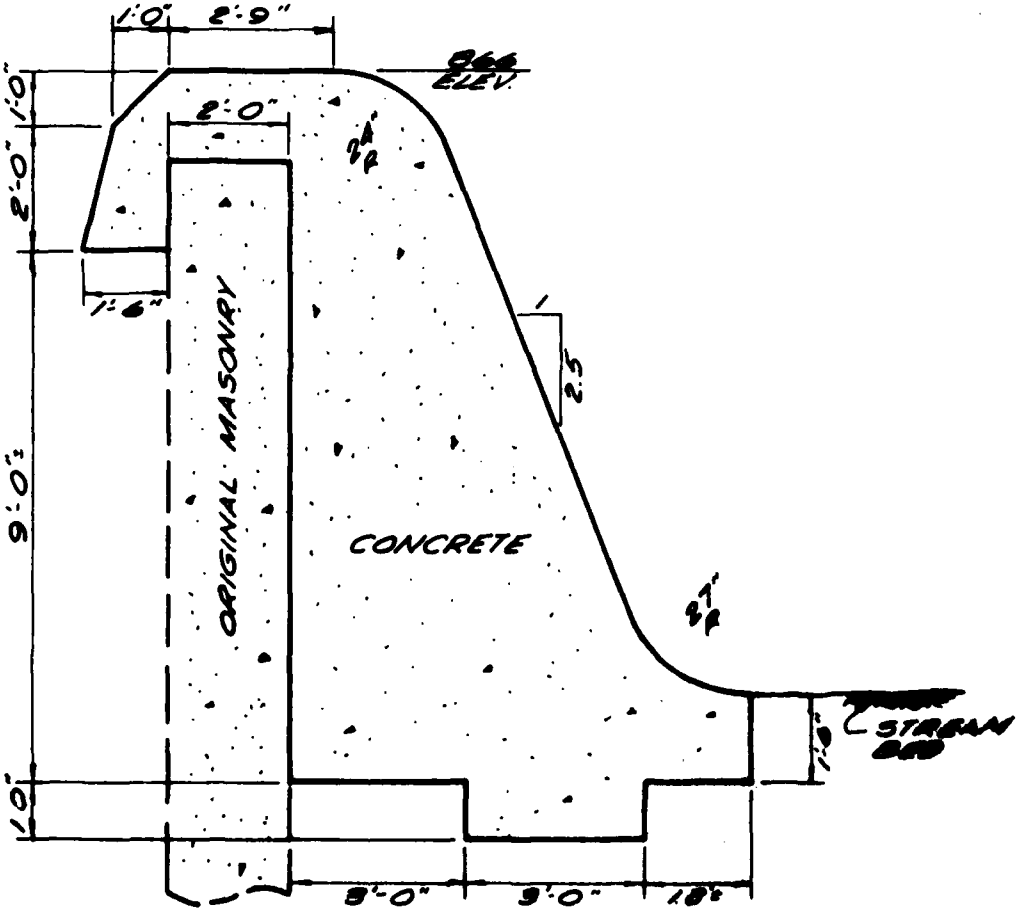
$d = \frac{(86-60.4)^{IK}}{8.81^{K}} = 2.91' = 0.29\,b$

h) Sliding additional horiz. forces causing sliding due to horiz. acceleration of dam mass plus acceleration of reservoir water

$= .05N + V_w = .05(13.65)_{.68^K} + (.73)(.73\times.05\times.0624\times13)_{1.28}(13) = 0.96^{K}$

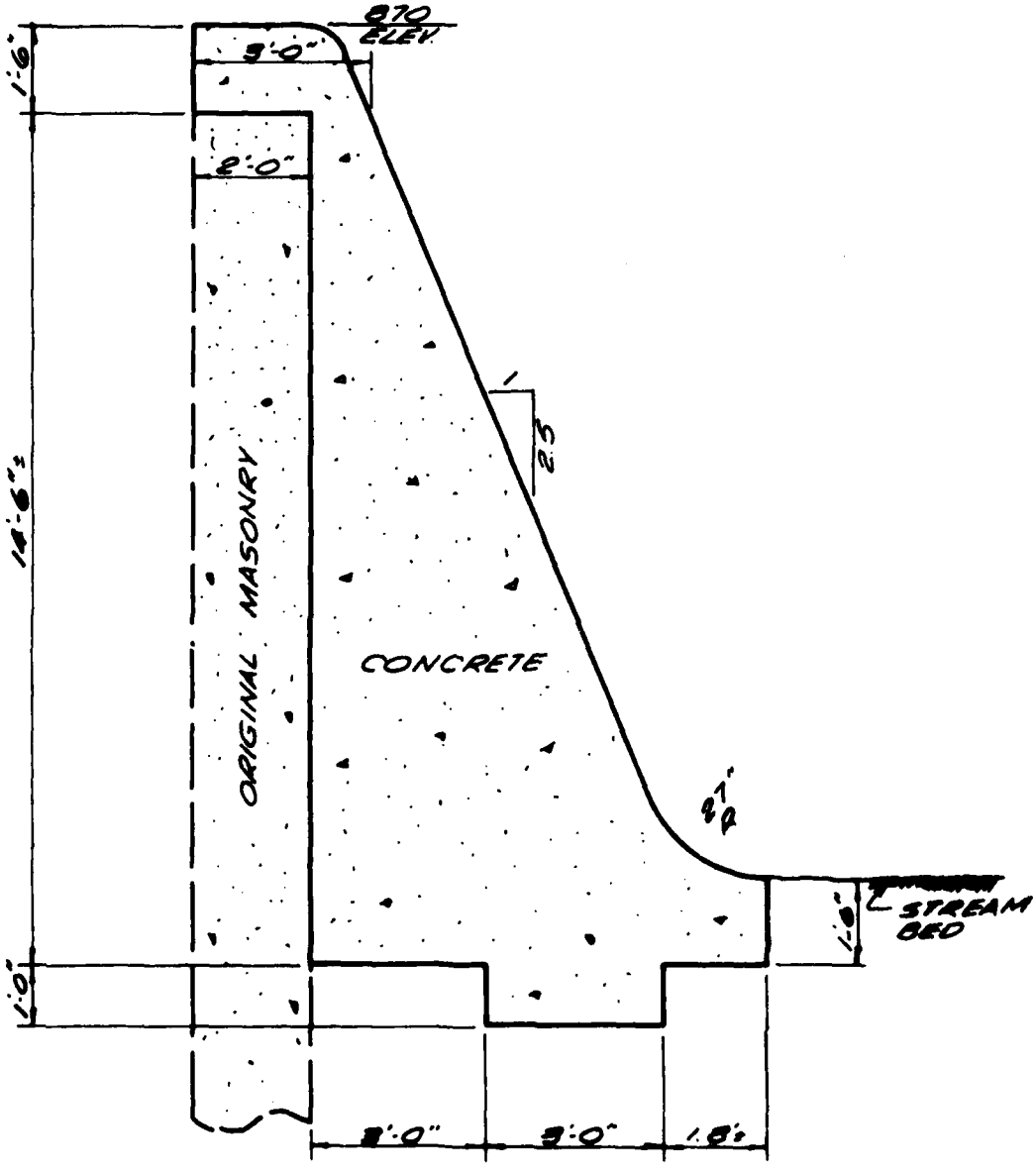
reduction in μN factor due to vertical acceleration of dam mass = (0.6)(13.65×.05) = negligible

FS = $\frac{5.5}{5.3+0.96} = \underline{0.9\pm}$ (unsafe)
6.26



LOON LAKE DAM
NO SCALE

STETSON • DALE	5-1-80	O.M.E.	TYPICAL SPILLWAY SECTION
	2899		



LOON LAKE DAM
NO SCALE

STETSON • DALE	5-1-80	O.M.E.	TYPICAL NON-OVERFLOW SECTION
	2399		

APPENDIX E

REFERENCES

APPENDIX

REFERENCES

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